DOCUMENT RESUME

ED 345 844 PS 020 517

AUTHOR Wakai, Kunio, Ed.
TITLE Research and Clinical Center for Child Development Annual Report, 1990-1991, No. 14.
INSTITUTION Hokkaido Univ., Sapporo (Japan). Faculty of Education.
REPORT NO ISSN-0386-8435
PUB DATE Mar 92
NOTE 116p.; For 1989-1990 Annual Report, see ED 336 192.
PUB TYPE Collected Works - General (020) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS Achievement Need; Children; Childrens Art; *Cognitive Development; Cognitive Style; Cross Cultural Studies; *Early Childhood Education; Elementary Education; *Emotional Development; Emotional Experience; Foreign Countries; Freehand Drawing; Infants; Intelligence; Love; Metacognition; Mother Attitudes; Mothers; *Parent Child Relationship; Spatial Ability; Teaching Methods; Young Children
IDENTIFIERS *Japan

ABSTRACT

This annual report by the Research and Clinical Center for Child Development at Hokkaido University in Sapporo, Japan contains 10 articles by Japanese and American researchers on various aspects of children's cognitive and affective development. The following articles are presented: (1) "Making the Cut: Early Schooling and Cognitive Growth," by Frederick J. Morrison; (2) "Aspects of Children's Learning Behavior in Different Instructional Settings," by David E. Day and Gail E. Libertini; (3) "Achievement Motive in Japanese Children Revealed by Peer- and Self-Rating on Behavior Characteristics," by Misako Miyamoto; (4) "Japanese and American Mothers Perceiving and Evaluating Their 5-Month-Old Infants' Emotion Expressions: A Cross-Cultural Perspective," by Yuko Kanaya and others; (5) "Emotion Attuning Systems: Its Micro-Analysis in Infancy and Early Childhood," by Osamu Suda; (6) "The Microgenesis of Graphic Representation in Children," by Shing-jen Chen; (7) "Evaluation of One's Task Performance in Reflective and Impulsive Children: Analysis of Metacognition," by Hiroshi Usui; (8) "Analyzing Eye-Fixations to Assess Individual Differences in Solution Strategies for Spatial Tasks," by Kimiharu Satoh; (9) "Perspective Taking in Children's Drawings of Balls," by Yukari Shirotani; and (10) "A Quest for Parental Love: How Do Japanese Mothers Conceive Mother's Love?" by Kunio Wakai. (AC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

PS 020517

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Kunio Wakai

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

BEST COPY AVAILABLE

FACULTY OF EDUCATION
HOKKAIDO UNIVERSITY
Sapporo Japan

RESEARCH AND CLINICAL CENTER FOR CHILD DEVELOPMENT

Annual Report
1990-1991
No. 14

March 1992
Editor: Kunio Wakai

CONTENTS

Making the Cut : Early Schooling and Cognitive Growth ····· 1
Frederick J. Morrison

Aspects of Children's Learning Behavior in Different Instructional Settings ····· 11
David E. Day and Gail E. Libertini

Achievement Motive in Japanese Children Revealed by Peer- and Self-rating on Behavior Characteristics ····· 31
Misako Miyamoto

Japanese and American Mothers Perceiving and Evaluating Their 5-Month-Old Infants' Emotional Expression : A Cross-cultural Perspective ····· 41
Yuko Kanaya, Donna Bradshow, Joseph Campos, Rosemary Campos, and Kazuo Miyake

Emotion Attuning Systems : Its Micro-analysis in Infancy and Early Childhood ····· 53
Osamu Suda

The Microgenesis of Graphic Representation in Children ····· 63
Shin-jen Chen

Evaluation of One's Performance in Reflective and Impulsive Children : Analysis of Metacognition ····· 73
Hiroshi Usui

Analyzing Eye-fixation to Assess Individual Differences in Solution Strategies for Spatial Tasks ····· 81
Kimiharu Satoh

Perspective Taking in Children's Drawing of Balls ····· 93
Yukari Shirotani

A Quest for Parental Love : How Do Japanese Mothers Conceive Mother's Love ? ····· 97
Kunio Wakai

目　次

認知発達に及ぼす就学の効果：「カット・オフ法」による吟味 …… 1
フレデリック・モリソン

異なる指導場面における子どもの学習行動の諸相……11
デーヴィッド・デイ，ゲール・リバティーニ

同輩および自己による行動評定に現れた日本の児童の達成動機……31
宮本美沙子

5カ月児の情動表出に関する日本とアメリカの母親の知覚と評定：
交差文化的視点から……41
金谷　有子，ドナ・ブラッドショウ，ショセフ・キャンポス，
ローズマリー・キャンポス，三宅　和夫

情動調整システム：乳幼児期におけるマイクロ・アナリシス……53
須田　　治

児童における描画の微視的発生……63
陳　　省仁

熟慮型及び衝動型児童の自己成績評価：メタ認知の分析……73
臼井　　博

空間課題の解決方略における個人差の測定のための凝視の分析……81
佐藤　公治

球体の描画における子どもの視点取り……93
城谷ゆかり

親の愛への一つの問いかけ：日本の母は
「母親の愛」をどう考えているか？……97
若井　邦夫

MAKING THE CUT: EARLY SCHOOLING AND COGNITIVE GROWTH

Fredrick J. Morrison
University of North Carolina at Greensboro

Abstract

The role of early education in cognitive growth was examined, by capitalizing on a natural experiment termed "school cutoff." Children who just made vs. missed the cutoff for grade one, were compared on growth of memory, language, and reading skills over a two year peiod. Findings revealed that early schooling produced a powerful and unique improvement in short-term memory skills and strategies, with no evidence of an age × experience interaction. Further, growth of three levels phonological segmentation skill (syllabic, subsyllabic and phonemic) showed distinctly different developmental and schooling influences, conforming to a domain-specific view of early cognitive growth. Finally, the contribution of age alone to early acadmic success was found to be minimal. Together, results revealed the powerful and unique impact of early schooling on cognitive development. In addition, findings confirmed the usefulness of the school cutoff methodology in elucidating important sources of developmental change in young school-age children.

The nature-nurture controversy in research on human cognitive development settled into a complacent, middle-aged interactionism some time over the last two decades, lulled there, in part, by the dominance of classic Piagetian theory and by the almost exclusive reliance on cross-sectional methodology and laboratory-based experimentation (Morrison, Lord, and Keating, 1982). These dominant orienting attitudes and practices tended to create a view of the child as advancing intellectually and socially in readily predictable sequences (or even stages), with rather domain general skills emerging as a function of experience.

In reality, notwithstanding interactionist claims, this dominant perspective created a rather traditional maturationalist ethos in which the actual role of experience was simply not adequately addressed (Fischer, 1980). In practice, a kind of 'horticultural' metaphor of development emerged, in which children were viewed like flowers that grow and develop in an orderly, predictable fashion with the environment relegated to the status of soil, whose sole contribution was to provide richer or poorer nutrients and thus accelerate or retard the rate of development of a sequence of events coded in and

Request for reprint should be addressed to Professor Frederick J. Morrison at Department of Psychology, The University of North Carolina-Greensboro, Greensboro, NC 27412-5001, U. S. A.

guided by genetic influences.

In recent years, however, a growing body of evidence has documented the dramatic impact that specific experiences related to schooling (Stevenson & Lee, 1990), literacy (Scribner & Cole, 1981), and specialized experties (Ceci & Liker, 1986; 1988; Chi & Ceci, 1987) can have on growth of a wide array of important cognitive skills. In addition, accumulating evidence tends to view such feats of learning as predominantly domain-specific, at least initially (Keating & Crane, 1990.) As a result, this research has reawakened interest in the powerful and unique influence of specific experiences on psychological growth and concurrently raised questions about the adequacy of the horticultural metaphor and its dominant underlying maturationalist emphasis.

In recent years, we have been utilizing a 'natural experiment' termed 'school cutoff', to examine the roles played by early schooling experiences in the timing and nature of development of cognitive skills. With some notable exceptions, our research to date has documented that early schooling experiences produce dramatic and unique changes in selected cognitive skills. Further, some changes observed appear to be quite domain- or even sub-domain-specific and sensitive to changes in environmental demands of the schooling experience. Finally, within limits, the unique contribution of maturation- or age-related factors (at least as traditionally conceived) is much less evident.

The Natural Experiment

These conclusions have been reached as a result of findings growing out of our study of children who just make vs. miss the cutoff for school entry. This natural experiment has permitted us to compare cognitive growth in two groups of children, almost identical in age and matched on background characteristics. One group of children, having just made the cutoff for grade one by virtue of birthdate, receive a formal grade one experience while another group of children, whose birthdate causes them to just miss the cutoff, go to Kindergarten. Comparison of changes in cognitive skills in the two groups using a pre-post design permins assessment of the impact of the grade one schooling experience on growth of cognitive skills.

Schooling and Growth of Memory Skills

In one of our first studies (Morrison & Smith, in review) we examined the impact of schooling on changes in memory performance and memory strategies. Children were shown nine pictures of common objects for later recall and asked to overtly verbalize whatever strategies they might be using to help them remember. Results from that first study are shown in Figure 1, depicting a number of pictures recalled at pretest and post-test by children who had just made (Y1) vs. just missed (K) the cutoff——they were 41 days different in age and equated on IQ, SES and amount of daycare experience. The graph reveals first, that there were no group differences in memory at pretest, illustrating that little improvement in memory had occurred in the Y1 group during their previous Kindergarten year. This conclusion is reinforced by the finding that after a year of Kindergarten schooling, the K group at post-test showed no improvement in memory performance. In contrast, after a year in first grade, the Y1

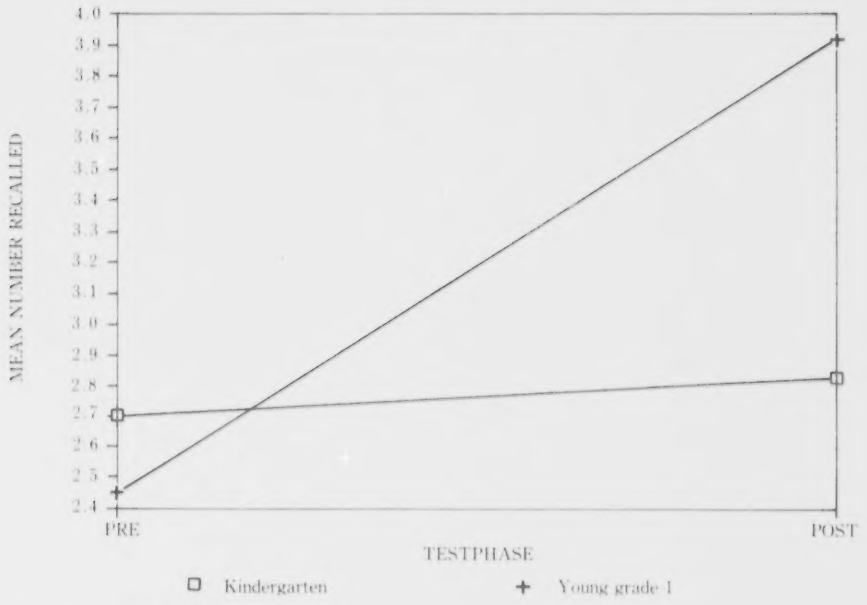


FIGURE 1 Mean number of pictures recalled by Y1 and K children at pretest and postest 1.

children showed a dramatic rise in memory performance. Additional measures of strategic behavior revealed that the Y1 children had acquired more active, cumulative rehearsal strategies after a year in grade one, whereas Kindergarten children remained passive rehearsers throughout the same period in Kindergarten.

An Age × Experience Interaction

These initial findings constituted direct evidence for the powerful and unique influence of schooling on growth of short-term-memory performance and skills. The cutoff method also permitted assessment of possible age × experience interactions, since the following year the original Kindergarten children went to grade one, but almost a year older than the original Y1 children, who now went to grade 2. Results from the second post-test are shown in Figure 2 together with the previous data. As depicted, the original Kindergarten children, following exposure to grade one, showed significant increases in memory performance. Nevertheless, the degree of increase for the K children was not greater than that shown by the original Y1 children a year earlier——hence there was no evidence that being older enhanced the impact of grade one schooling on growth of memory skills——no age × experience interaction, in other words. Taken together, results from this first study demonstrated that growth of immediate memory skills was exclusively a product of the grade one schooling experience.

Early Schooling and Phonological Segmentation

A separate study (Morrison & Dow, in review) examined the role of aspects of

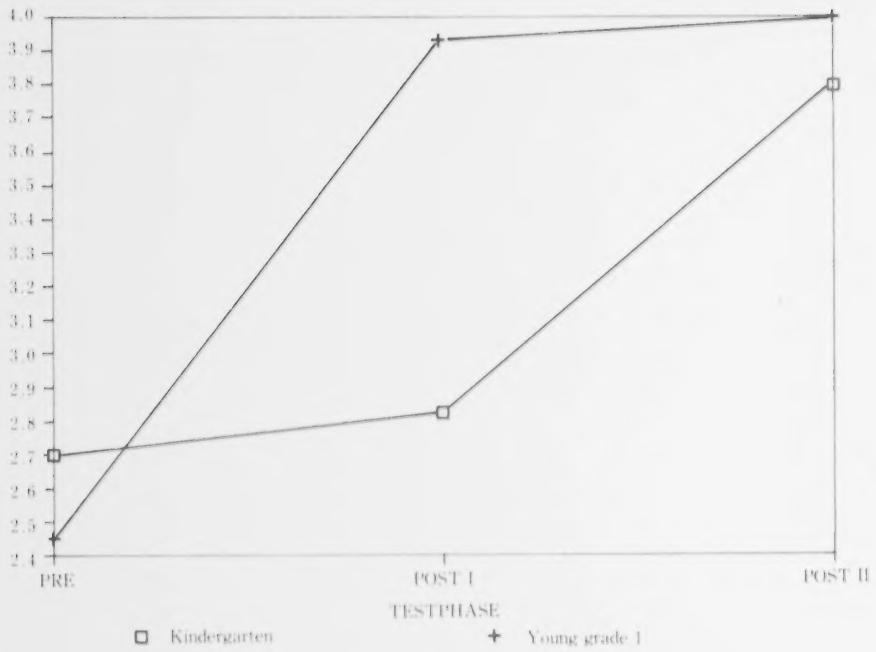


FIGURE 2 Mean number of pictures recalled by the two groups at pretest and postest 1 and 2.

early schooling, especially exposure to formal reading instruction, on growth of phonological segmentation, highlighting growth of phonemic awareness. Some uncertainty has existed in the literature about the causal status of phonemic awareness in early reading acquisition. The cutoff methodology provided a unique test of the independent and reciprocal relations between phonemic awareness and reading acquisition (Perfetti, 1985). In addition, the study assessed growth of children's skill in segmenting two other phonological levels——the syllable and sub-syllable.

In this study, following training and practice, children were asked to say how many sounds a word contained, using a variant of the standard token task. As in the previous study, a pre-post$_1$-post$_2$ design was utilized with Y1 and K children to assess the impact of early schooling as well as possible age × experience interactions on growth of three levels of phonological segmentation.

Figure 3 depicts the results for phonemic awareness across the three testing intervals. As shown, the two groups children performed equivalently on the pretest. At first post-test, the K children showed a modest but reliable increase in phonemic segmentation scores following a year in Kindergarten. Nevertheless, the Y1 children manifested a much larger increase in phonemic awareness following exposure to more formal reading instruction in grade one. Finally, at second post-test, the original K children manifested a strong increase in phonemic segmentation scores, but no greater than the Y1 children had a year earlier, despite beginning at a higher level at the end of Kindergarten. These findings supported the view that the most significant changes in

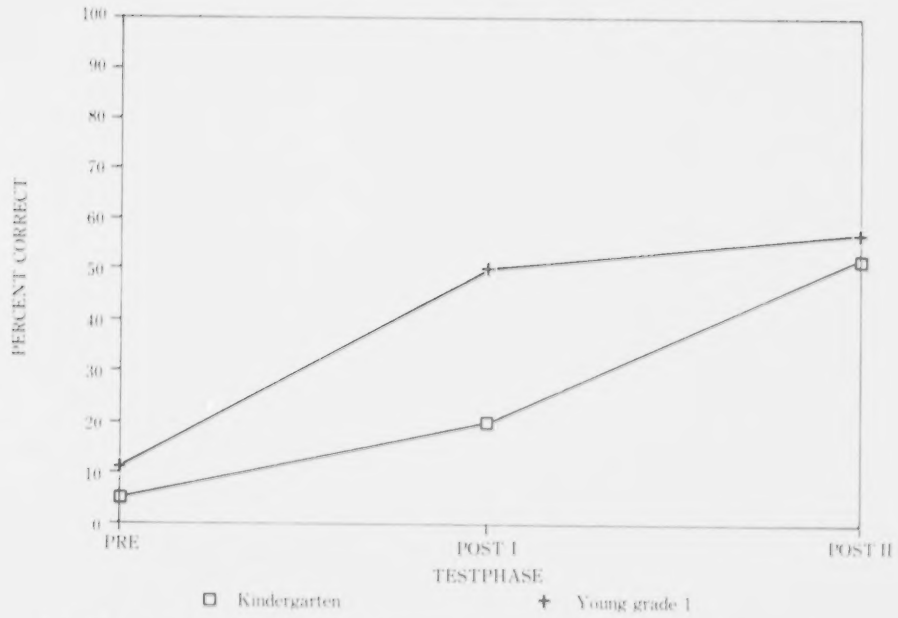


FIGURE 3 Level of performance in phonemic segmentation achieved by the two groups across the three testing intervals.

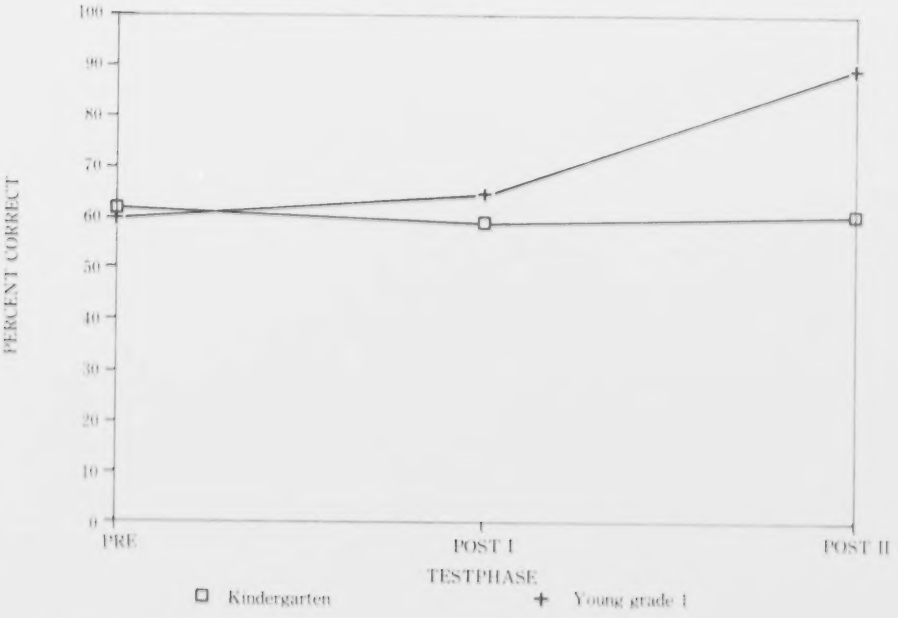


FIGURE 4 Level of performance in syllabic segmentation achieved by the two groups across the three testing intervals.

phonemic awareness were a result of exposure to formal reading instruction in grade 1.

Further examination of the change scores for syllabic and subsyllabic segmention permitted assessment of whether children were learning a general segmentation skill that would cut across levels of phonological analysis or whether the newly acquired skill in phonemic segmentation would be limited to that sub-domain.

Figure 4, depicting growth of syllabic segmentation skill, reveals a very different pattern from that of phonemic awareness. First, performance at pretest was higher for syllabic than for phonemic awareness——preschool children are inherently better at segmenting syllables than phonemes. Second, almost no schooling or age effects emerged at first post-test. Yet at second post-test, there was a clear and very reliable "grade two effect"! The original Y1 children manifested a sharp unique increase in syllabic segmentation following grade 2. Examination of the curriculum and informal interviews with teachers confirmed the suspicion that, starting around grade two, more emphasis is placed on mastery of the idea of a syllable and of the skill of syllabic segmentation.

Results for sub-syllabic segmentation are shown in Figure 5. It is clear from the figure that sub-syllabic segmentation skill was intermediate between syllabic and phonomic segmentation and followed a unique developmental pattern. Essentially, sub-syllabic segmentation skill showed a modest improvement over time with no evidence for any unique impact of schooling. These findings are consistent with the notion that sub-syllabic segmentation may represent a somewhat later developmental or educational achievement, dependent upon acquiring higher-order linguistic knowledge of word stems and analogical word decoding processes in reading.

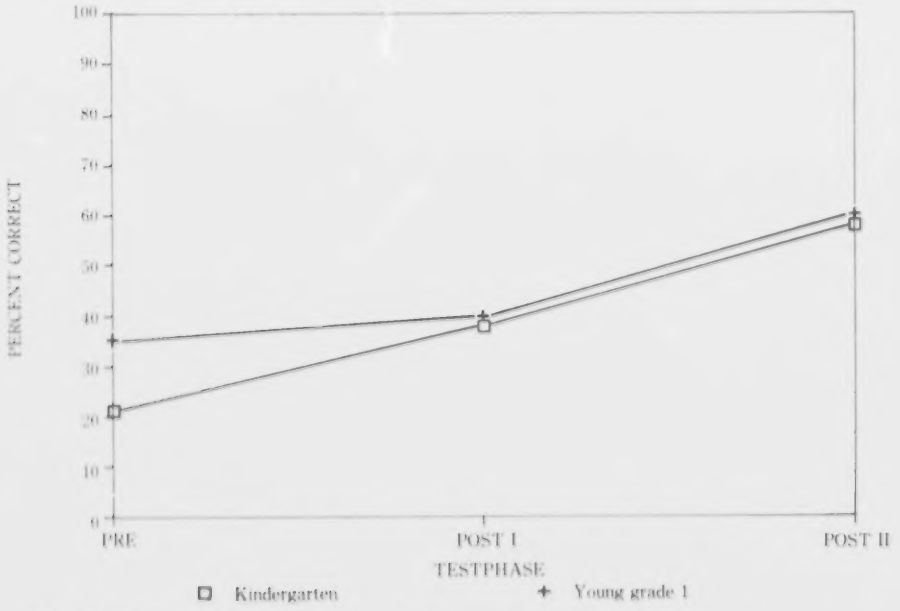


FIGURE 5 Level of performance in subsyllabic segmentation achieved by the two groups across the three testing intervals.

Taken together, results from the three tasks showed very different patterns of change and influence. As such the findings reinforced recent demonstrations that competence learned in one domain (or even sub-domain) does not automatically transfer to other domains requiring similar cognitive processes (Keating & Crane, 1990).

The Influence of Age-Related Factors

Findings from the above two studies have impressed on us the power of specific experiences in shaping the timing and nature of development of selected cognitive skills. Partly as a consequence, we became concerned by claims in the popular and scientific literature about the importance of entrance age on school readiness, achievement and social adaptation. Specifically, claims have been made that children who are young when they enter grade one (essentially 5-year olds and especially boys) are not cognitively and/or socially *mature* enough to benefit from formal schooling. Hence local school officials and pediatricians routinely recommend that children close to the school cutoff date be held back prior to Kindergarten or retained an extra year in Kindergarten, in order to "buy the gift of time."

Parenthetically, if correct, this concern would have been particularly devastating in Edmonton, Alberta (the site of our original research) since the cutoff date for school entry in Edmonton is March 1, the latest cutoff date in North America. Edmonton thus has the youngest children on the continent receiving formal grade one instruction.

Since our own experimental studies revealed clear and unique benefits for these children in cognitive growth, and since the existing research suffered serious methodological and logical problems, we undertook to study directly whether young grade one children were at greater risk for academic failure. Stated another way, we endeavoured to assess whether age *per se* contributed significantly to the impact of early schooling or academic achievement.

As part of a large ongoing study on this topic, we assessed reading scores in three groups of children, matched on IQ, SES and daycare experience: young grade one students and Kindergarten students, selected as in the earlier studies; and old grade 1 students (O1) who had just missed the cutoff for grade one the previous year.

Results for reading achievement across the three testing intervals are shown in Figure 6. Here, grade level equivalent scores on the Wide Range Achievement Test are shown for the three groups of children. As shown, at pretest, there was small differences among groups favoring old grade one children. More striking, however, was the finding that the degree of progress made by Y1 children over the course of first grade was identical to that of older children and far greater than the almost-age-equivalent Kindergarten children. Thus, as a group, young grade one children learned as much as older grade one children, at least in elementary word reading skill, given their starting points. Moreover, the progress of the Y1 children was far greater than it would have been, if they had stayed in Kindergarten. Perhaps most striking, the small initial difference between O1 and Y1 children at pretest and end of grade one was completely eliminated by the end of second grade.

The overall pattern of changes in the three groups demonstrated rather dramati-

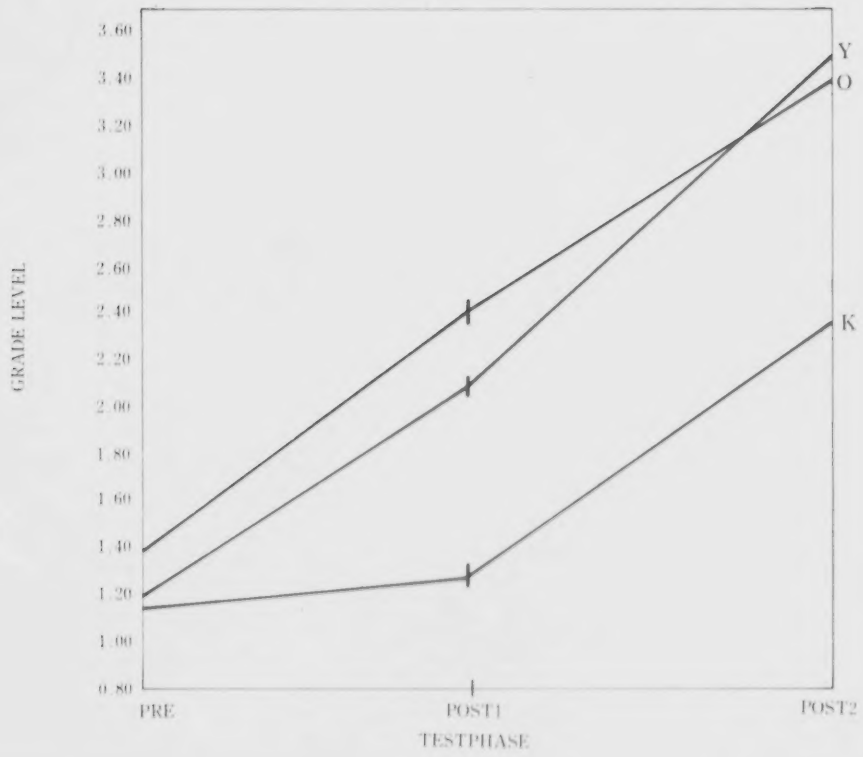


FIGURE 6 Grade level equivalent reading scores on the WRAT R for YI, K, and OI children cross the three testing intervals.

cally that, in and of itself, age was a poor predictor of learning to read. Coupled with our earlier failure to find significant age × experience interactions in memory and language development, our research to date has consistently found that, within obvious limits, age-related factors (like maturation) do not contribute significantly to changes in cognitive, linguistic, and academic skills during the period under study.

In conclusion, findings to date utilizing the school cutoff procedure have demonstrated that exposure to early schooling produces measurable gains in cognitive, linguistic, and academic skills. The early schooling experience appears to emphasize growth of specific skills and sub-skills needed for functioning during a particular learning phase in the educational curriculum. As a result, children in school develop relatively isolated, domain-specific skills rather than general thinking strategies. Whether they might also learn general cognitive skills remains an open question. Finally, the school cutoff methodology revelead itself to be a sensitive and discriminating procedure for examining the nature and causes of important developmental changes during the early school years.

REFERENCES

Ceci, S. J. & Liker, J. (1986). A day at the races: a study of I.Q., expertise and cognitive complexity. *Journal of Experimental Psychology: General*, **155**, 255-266.

Ceci, S. J. & Liker, J. (1988). Stalking the I.Q. expertise relationship: when the critics go fishing. *Journal of Experimental Psychology: General*, **117**, 96-100.

Chi, M. T. H. & Ceci, S. J. (1987). Content knowledge — its role, representation and restructuring in memory development. In H. W. Reese (ed) *Advances in Child Development and Behavior*, **20**, New York: Academic Press, 91-142.

Fischer, K. W. (1980). A theory of cognitive development: the control and construction of hierarchies of skills. *Psychological Review*, **87**, 277-331.

Keating, D. P & Crane, L. L. (1990). Domain-general and domain-specific processes in proportional reasoning. *Merrill-Palmer Quarterly*, **36** (3), 411-424.

Morrison, F. J., Lord, C., & Keating, D. P. (1982). *Applied Developmental Psychology*. New York: Academic Press.

Morrison, F. J. & Smith, L. (in review). Education and cognitive development: a natural experiment.

Morrison, F. J. & Dow M. (in review). Development of phonemic awareness: a natural experiment.

Perfetti, C. A. (1985). *Reading ability*. New York: Oxford University Press.

Stevenson, H. W. & Lee, S. (1990). Contexts of achievement. *Monograph of the Society for Research in Child Development*.

ASPECTS OF CHILDREN'S LEARNING BEHAVIOR IN DIFFERENT INSTRUCTIONAL SETTINGS

David E. Day
Buffalo State College
Gail E. Libertini
University of Massachusetts

Abstract

Children from two primary grade classrooms were observed in three different instructional settings: large group-teacher-directed; large and small group-teacher-directed with some independent activity; and child choice activities. Aspects of the children's cognitive functioning, materials use, language behavior, peer interaction, and task involvement were recorded. Three questions were investigated: (1) Do children in the same lesson behave alike?; (2) Do children change their behavior from one lesson type to another?; and (3) What effects do lesson types have on the five aspects of children's behavior listed in the sentence above? The results revealed a homogeneity of behavior among children within lesson types and a shift in behavioral modality from one lesson type to another. These results are consonant with Barker's (1968) critique of human ecology and Stodolsky's (1988) study of the influence of subject matter. Children's learning behaviors were congruent with lesson type, too. Larger group, more teacher directed lessons resulted in a more passive-responsive behavioral profile. Lessons with increased child choice were related to higher levels of cognitive functioning, increased language production and cooperative behavior, and more generative use of materials; an interactive-generative behavioral profile.

Introduction

The ecological critique of human behavior by Barker (1968) led to three generalizations: (1) human behavior changes from setting to setting to meet the conditions of each setting, (2) the behavior of persons in any setting is more alike than different, and (3) a person's behavior tends to be consistent over time in the same or similar setting. Barker's analysis of person-environment interaction provided for behavioral variance in any setting, the expression of personal need, and the possibility for change in setting purpose as the consequence of person-environment interaction. Nonetheless, the essence of his critique is often stated in terms of the coercion of human behavior by setting (Bruner, 1965).

According to Barker's theory, behavioral coercion occurs as a consequence of the

Request for reprint should be addressed to Professor David E. Day at Department of Elementary Education and Reading, Buffalo State College, Buffalo, NY 14222-1095, U. S. A.

interaction of features of a behavior setting. Three which have particular importance are standing patterns of behavior (SPB), milieu, and the consonance of SPBs and the milieu. SPBs are the behaviors commonly expected of all participants in any setting. It is a setting specific, extra-individual phenomenon such that one can refer to block area behavior and circle-time behavior with some assurance of being understood. The milieu or physical structure of a behavior setting refers to an activity or setting bounded in time and/or space. Consonance is what Barker refers to as the essential fittingness of SPBs and the milieu; the anticipated behaviors of any setting are congruent with its physical and temporal structure. Under such circumstances the "standing patterns of behavior remain essntially the same although individuals come and go" (Schoggen, 1978, p. 37). A classroom typically meets the conditions of a behavior setting. Activities and areas within the classroom, such as the block corner and arts area of a kindergarten, can also have the characteristics of behavior settings.

This theory suggests that the ecological environment is more powerful than the psychological state of being of persons in affecting molar, or ongoing, behavior (Bronfenbrenner, 1979). It is, as Barker has suggested (1968), as though the outside environment of the person is typically more powerful than the inside environment; one's motivation, will, intention, and need may be compromised by the behavioral demands of a setting.

Barker's theory raises a number of questions regarding the nature of the integrated personality so much a part of western psychological belief, in particular the concept of stability; the degree to which one can predict a person's behavior over time and across settings. In classrooms the concept of stability has been made manifest in work related to cognitive and learning styles (Dunn & Dunn, 1978; Kogan, 1983; Gregorc, 1985; Sternberg, 1990). In brief, it is often asserted that children have a dominant learning or cognitive style which they use in most if not all classroom exercises. Furthermore, it is asserted that knowledge of style ought to be used by teachers in designing learning activities so as to enhance learning.

However, it is entirely possible by extending Barker's theory to suggest that children may módify their molar behavior to accommodate to the demands of alternative learning environments. And, if this is observed, one might suggest that children have multiple cognitive and/or learning styles which they draw upon as required by the events or the structure of varied learning activities.

There have been several studies of the behavior of young children in child care and education settings which, in one way or another, support the accuracy of Barker's theory. Smith and Connolly (1980) completed studies of the effects of physical space, the amount and kind of materials, and adult roles on the behavior of nursery school children and found that as environmental conditions changed, so too did the behavior of the participants. Weinstein (1977) found that the learning appropriate behavior of second graders was influenced by making changes in the physical arrangements of the classroom. Garner (1990) cites a study by Hall and colleagues (1987) which found strong setting effects for children's use of language which was decriptive of levels of cognitive functioning.

Gump (1967) and Day (1983) argued that classrooms are dynamic environments

comprised of a series of temporally and spatially related behavior settings, each with a set of purposes and expectations potentially quite different from all others. They suggested that children will of necessity change their behavior as they move from one setting to another, from reading to science, and from block play to the art corner, as a consequence of their perception of the demands of each setting.

A study by Oxford, Morrison, and Mckinney (1979) supports this assertion. They described the action structure of lessons and other learning activities in kindergarten with particular attention to children's task involvement. They found that such factors as the size of the instructional group, children's influence on their action in any lesson, and instructional format, all contributed to the proportion of time students spent on task.

Stodolsky (1988), building upon Barker's theory, studied the context and behavior of fifth grade students in mathematics and social studies lessons. She documented variety in the daily experiences of children related to subject matter; social studies was not the same experience for children as mathematics even when taught by the same teacher. Furthermore, Stodolsky found that the variance in children's behavior was greater in social studies than mathematics. She attributed this variance to a mix of the values shared by teachers and children regarding the comparative importance of mathematics and social studies in the order of school things, and an instructional format which seemed to reflect this value hierarchy resulting in modification in the mode of interacting in learning task from one discipline to the other. In each subject, the students, by and large, sought to understand and meet the conditions of each lesson, to seek engagement, and to remain curious and attentive albeit in different ways.

This study builds upon Gump's and Day's elaborations of the Barker critique in ways similar to that of Stodolsky. The purpose is to describe and contrast aspects of young children's cognitive, linguistic, social, materials use, and task engagement behavior in instructional settings varied by group size, instructional format, and degree of child autonomy. Observations and video tapes were made of three children in each of two early childhood classrooms over a two month period of time.

Research Questions

Young children do change their behavior as they move from context to context. However, there is not a large body of data describing the substantial character of these changes nor of the contextual conditions under which these changes occur (Garner, 1990). Like Stodolsky, this study explicated the cognitive, linguistic, materials use, child to child engagement, and task involvement behavior of the children and related these behaviors to contextual factors of instructional format, source of pacing for the activity, and the organizational structure of the lesson (Stodolsky, 1988).

The following questions were addressed:

1. Do children in the same or similar lesson structure behave alike?
2. Do children change their patterns of behavior as they move from one lesson type to another?
3. What effects do lesson types have on the behavior of children in regard

to aspects of:

3.1 cognitive functioning;
3.2 materials use;
3.3 language behavior;
3.4 peer interaction; and
3.5 task involvement?

Questions 1 and 2 are designed to test the homogeneity of response among children within lessons and variation between lessons. Substantial variation within lesson types and little change in behavior across types would support the conventional belief in behavioral stability and the power of the internal environment. Such results would not support the Barker thesis. Assuming affirmative answers to both questions 1 and 2, answers to question 3 will offer a descriptive behavioral profile of the children by lesson type, the more interesting data from this study. Such a profile will illustrate the substantial changes in behavior children make as they move from lesson to lesson.

Method

Subjects

Six children, three from each of two classrooms in a non-graded school, comprised the sample for this study. (One child from the original sample of four from each classroom had to be dropped from each classroom because of absence.) The ages of the children in one classroom were 5-7 years, in the other 7-9 years. The children were selected by the teacher in each classroom primarily because they represented typical learners. Two boys and one girl were selected from the younger group; one boy and two girls were chosen from the older group. English was the first language for all children.

The data for the study are presented by classroom; children aged 5-7 years are referred to as the "younger" group, children 7-9 years as the "older" group. The reasons for separating the data by class are straight forward. First, there were presumed developmental and learning differences resulting from both age and experience in school. Second, though both classrooms fit the description for a non-graded school, the physical structure and the character of the classrooms were different. Third, as will become apparent in the presentation of the lesson type data, the subject matter for the same type lessons across the classrooms was different in ways which made the aggegation of data problematic.

Lesson Types

The children in each classroom were observed in three types of lessons which varied by instructional format, the source of pacing for the lessons, and structure of the instructional group. The lessons were defined as: (1) *Teacher Directed/Large Group* - teacher directed, total class for the entire lesson; (2) *Teacher and Child Directed/Large and Small Groups* - predominantly teacher directed with a maximum of 25% child directed activity, where the teacher presented the content or procedures of the lesson to the whole class or most of the children after which there were work groups of 2 to 5

children; and (3) *Child Directed*-child directed activity with group size a function of the children's choice of activity. Data describing the instructional format, lesson pacing, and organization of the children are presented in Tables 1 through 6.

In the classroom with younger children Type 1 lessons (Teacher Directed/Large Group) were morning meeting and language arts where the teacher led the entire class in opening exercises, introduced the letter of the day, asked questions of substance about earlier letter lessons, and focused discussion on selected topics. A didactic teaching mode predominated.

Type 1 lessons for the older children consisted of the entire class gathered about the teacher during which time individual children would read excerpts of stories they had written and receive questions and comments from the teacher and the other children. These lessons were a regular part of the writing and reading curriculum.

TABLE 1

Instructional Format by Lesson Type: Younger Children

	Type 1[1] (Language Arts)	Type 2 (Math)	Type 3 (Choice)
INSTRUCTIONAL FORMAT			
Indep. Seatwork	.3%[2]	22.6%	
Discussion	99.7	65.2	
Instructions		9.6	
Transition		2.6	
Choice			100%

[1] Type 1 = Total Class, Teacher Directed; Type 2 = Large & Small Group, Teacher Directed & Independent Activity; Type 3 = Child Choice of Activity.

[2] The percentage of time observed for each factor within each lesson type.

TABLE 2

Lesson Pacing by Lesson Type: Younger Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
SOURCE OF PACING			
Teacher	100%	77.4%	9.2%
Child		22.6	47.9
Child to Child			42.9

TABLE 3

Organization of the Children by Lesson Type: Younger Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
ORGANIZATION			
Total Class (instruction)	100%	33.3%	8.9%
> 5, < Total Class		57.3	
3-5 Parallel			13.2
2-3 Parallel		9.7	10.3
3-5 Cooperative			39.7
2-3 Cooperative		12.8	3.4
Isolate Activity			24.6

TABLE 4

Instructional Format by Lesson Type: Older Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
INSTRUCTIONAL FORMAT			
Indep. Seatwork		18.0%	
Recitation	15.7%	71.5	
Discussion	40.8	3.1	
Student Reports	36.8	.5	
Instructions	6.8	1.9	
Tutorial		4.9	
Choice			100%

TABLE 5

Lesson Pacing by Lesson Type: Older Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
SOURCE OF PACING			
Teacher	56.9%	79.9%	16.4%
Child	43.1	18.4	20.4
Child to Child			26.7
Mechanical			36.5

TABLE 6

Organization of the Children by Lesson Type: Older Children

	Type 1 (Language Arts)	Type 2 (Math)	Type 3 (Choice)
ORGANIZATION			
Total Class (instruction)	100%	33.3%	
Total Class (seatwork)		25.2	
> 5, < Total Class			11.6%
3-5 Parallel			7.5
2-3 Parallel		41.4	15.7
3-5 Cooperative			18.0
2-3 Cooperative			36.6
Isolate Activity			10.6

Type 2 lessons (Teacher and Child Directed/Large and Small Gqoup) for the younger children were instruction in mathematics. There were three format variations in these lessons: (1) teacher instruction about time using a model of a clock face; (2) work in dyads in which the children would quiz one another about telling time using a clock face; and (3) children completing individual worksheets on telling time.

Reading instruction was the subject of Type 2 lessons in the classroom for older children. In one lesson a group of children was being instructed on alphabetical order as they learned about the use of dictionaries. Other children were completing assigned seatwork. In other lessons children were reading in small groups led by the teacher, working with another child on a reading exercise or working independently at one's

desk. In each lesson there was some large group instruction followed by small group and independent activity.

For both groups of children Child Directed (Type 3) lesson observations were made during choice time. This was a period of time each day when the children were free to choose activities. Children were observed working at computers, completing seat tasks, playing games with other children-board games and fantasy play, engaged in social talk, or completing projects related to subject matter assignments. There was substantial variance in the nature of children's engagement, as would be expected. The significant variable is the child's decision how, where, with whom, and in what way engagement was to occur.

Categories of Behavior

Five categories of behavior were observed. They were: (1) Cognitive Functioning; (2) Language Behavior; (3) Materials Use; (4) Task Involvement; and (5) Peer Interaction Behavior. The category of Cognitive Functioning refers to the nature of intellectual activity observed in each lesson ranging from lesser to greater intellectual engagement. These behaviors were initially drawn from Stodolsky (1988) and adapted for use upon completion of a pilot study to reflect the ages and developmental levels of the children.

Language behaviors were derived from observation and deduction. They were designed to represent common linguistic options available to children in typical early education lessons.

Materials Use behaviors also have an empirical and deductive base reflecting options commonly extant in classrooms for young children. Behaviors included, but were not limited to, higher order intellectual behavior, e.g., invention, idiosyncratic materials use, and combining materials from different areas to produce novel or complex effects.

Peer Interaction behavior was comprised of an array of possible person-to-person interaction modalities from independent activity to cooperation. These behaviors reflected the type of social interaction required or expected in any lesson with considerable attention given to the possibility for collaboration, an indicator of a higher order interactive modality.

Task Engagement was a three dimensional index of children's attention to the task: on task, off task, and in transition between tasks.

Taping Procedures

Video tapes of each lesson type were made in each classroom during a two month period in the spring of the school year. The teachers were aware of the types of lessons we sought to tape and suggested possibilities. Observations were made by the researchers in advance of the video taping to determine whether or not the lessons suggested by the teachers seemed to meet the criteria for the three types. Subsequently a schedule for taping was arranged with the teachers that did not require any modification in their instructional schedule. The use of a video camera was not an infrequent event for the children in each classroom. There was no evidence that the

taping substantially altered the behavior of the teachers or the children.

Each lesson was taped in its entirety. A minimum of two lessons were taped for each child in each of the three lesson types. It was often possible to record all subjects in one lesson.

Two persons managed the video taping. One was the second author who directed the taping and made notes on the lesson. The second person, who was unaware of the purpose of the taping, operated the camera.

Data Coding Procedures

Each lesson was initially viewed by the researchers to determine if it did in fact meet the lesson type criteria for which it was chosen. Two lessons were subsequently not used because the instructional format varied substantially from any of the three types established for the study.

A time sampling procedure was followed in coding both the lesson type and child behavior data using a five second interval. Data were aggregated by the total number of entries per five seconds for each of three lesson type variables and the five behavior variables. The absence of an equal number of entries for each child within and across lesson types necessitated the use of percentages in the presentation of the data.

Reliability of the Coding

Two graduate students unaware of the purpose of the study were trained to code the tapes by the second author. Video tapes not used in this study were used for training purposes. Each coder was tested for reliability against that of the trainer. The percent agreement for each lesson type variable and behavior variable was computed using the following formula: agreement divided by agreement plus disagreement multiplied by 100i.e., $(a/a+d)\times 100$. Training continued until agreement reached 90%. The tapes were coded independently by each coder.

Results

Lesson Types

Three types of lessons, differentiated by (1) instructional format, (2) source of pacing of the lesson or activity, and (3) organizational structure of the children, were selected for this study. The proportional distribution of activity for each lesson is presented in Tables 1-6; the first three tables represent lessons for the younger children and the last three tables lessons for the older children.

Younger Children's Lesson Types

Type 1 lessons (Teacher Directed, Large Group) consisted of a series of language arts lessons for the whole class which occurred at circle time. Instruction was presented in discussion format (99.7%), paced entirely by the teacher (100%).

Mathematics was the subject matter for Type 2 lessons(Large and Small group, Teacher Directed and Independent Activity). A varied instructional format was followed: 65% discussion in groups of varying sizes; independent seatwork (22.6%); and just less than 10% of the time was devoted to giving instructions. The children paced

their activity 22.6% of the time. The organization for instruction varied widely from total group (33%) to groups larger than five but less than the whole class 57% of the time. Children were observed in small group cooperative (12.8%) and parallel (9.7%) activity for a substantial amount of time.

Type 3 lessons were taped during choice time. Children were free to move about the room and busy themselves with whatever activity they chose. Over 90% of all activity was paced by the children. The organizational structure was widely variable with most activity being observed in settings with more than one child. In fact, cooperative structures were observed 43% of the time and parallel activity 23.5% of the time. Children also used choice-time to be alone (24.6%).

Older Children's Lesson Types

Type 1 lessons were organized with the whole class gathered on the floor in an open spot in the room with the teacher at the center. One by one, children would read from writing projects completed or in progress after which the teacher would lead a critique of the writing by the other children in the class. Reading and discussion of the papers accounted for 77% of all activity. The remaining time focused on recitation (15.7%) -typically the teacher asking for information designed to foster discussion and giving instructions (6.8%). The teacher and the authors shared responsibility for pacing the activity (56.9% and 43.1%, respectively).

Type 2 lessons were taped during reading instruction. As might be suspected, the teacher engaging children in recitation (71.5%) and independent seatwork (18%) accounted for most of the time. There was some discussion (3.1%) and giving of instructions (1.9%). Pacing of activities was primarily the responsibility of the teacher (79.9%) with the children being responsible mostly during seatwork time (18.4%). The more formal instruction occurred in parallel groups of up to three children (41.4%). Instructing the whole class was observed about one third of the time (33.3%) and children spent about one fourth of the time at seatwork (25.2%).

As with the younger children, Type 3 lessons were taped during choice time. Pacing was varied with children working at the computer (mechanical pacing 36.5%), child-child paced (26.7%), children directing their own activity (20.4%), and children using choice time to receive instruction from the teacher (16.4%). The organization was as varied as it was for the younger children. Cooperative groups were observed 54.6% of the time and parallel activity seen 23.2% of the time with 10.6% isolate activity.

These data make clear the differences in lesson types in both calssrooms as defined by the criteria of instructional format, source of pacing, and organizational structure. Yet, there were differences in the ways in which each type was manifest in each classroom. This reflects at least two phenomena: (1) there can be differences in the nature of the instructional format across subject matter areas, e.g., differences between the structure for reading and mathematics (see Stodolsky, 1988); and (2) differences between the classrooms in the ways in which lessons are designed by each teacher. Such variation may also reflect differences in the effects of socialization of the children to the school experience and developmental differences between the two

groups of children. Whatever the explanation, children were observed under somewhat different instructional conditions within each type of lesson.

Children's Behavior

Variance Within and Across Lesson Behavior

Tables 7 (younger children) and 8 (older children) contain the results of an analysis of variance for the behavior of children within and across lesson types. In each category of behavior for both groups of children there were instances of too few observations to allow for meaningful application of the ANOVA. The analyses in each table include only those for which there was a substantial base.

For the younger children there was only one case out of eighteen in which there was significant variation in behavior among children within lesson type (prescribed use of materials). Yet, there were 12 behaviors which achieved a level of significance equal to or greater than .10 in the across-lesson analysis.

The older children's behavior within lesson type was similar to that of the younger children; the children tended to behave similarly within lesson type. However, the shift in behavioral modality across types of lesson for the older children was not as prominent; only 9 of 20 behaviors achieved a level of significance beyond the .10 level.

Nonetheless, these data allow one to assert that the children in each classroom tended to behave in a like manner within each of the three types of lessons and changed their behavior as they encountered a lesson with another structure. Hence, it seems warranted to assert that both question 1 and 2 can be answered in the affirmative: Children in the same or similar lesson structure behaved alike and they changed their pattern of interaction as they moved from one lesson type to another.

Effects of Lesson Type on Aspects of Learning Behavior

One question focused on the influence of lesson type on aspects of children's learning behavior: cognitive functioning, language behavior, materials use, peer interaction, and task involvement. This question was answered by examining the data presented in Tables 7-11. However, unlike question 2, these data were analyzed across lesson types within behavioral categories for the younger and the older children.

Cognitive Functioning

The data for cognitive functioning are presented in Table 9. In each lesson type, the older children were called upon or allowed to engage in a wider range of cognitive functioning behaviors than were the younger children. Nonetheless, there are strong similarities within lesson type for both groups of children.

In Type 1 lessons, the children spent most of their time listening, 77% younger and 63% older. The next most frequent behavior was responding to questions (youngers, 10%) and about equal amounts of oral recall and responding to questions for the older children (near 10% for each).

Listening remained a dominant behavior for the children in Type 2 lessons (23% youngers, 38% olders). However, there was considerable time spent giving responses (30% responding to questions for youngers, 21% question response & 12% oral recall

for olders). The younger children exibited some higher order cognition especially in creating and constructing products (12%).

Type 3 lessons were marked for the range of behaviors particularly higher order cognitive functioning. The children spent substantial amounts of time in creating and constructing (38% youngers), choosing among alternatives (43% olders) and a small

TABLE 7

Variance of Behavior Within and Across Lesson Types: Younger Children

		Mean Sum of Squares	Error	f[1]	Sign.
COGNITIVE FUNCTIONING					
Listen/Teacher	W[2]	181.388		.823	.502
	A	1,157.528	220.466	5.250	.076*
Observe	W	6.634		.788	.515
	A	190.021	8.419	22.569	.007*
Listen/Child.	W	33.341		.223	.809
	A	536.668	149.451	3.591	.128
Respond/Quest.	W	29.968		1.316	.364
	A	686.414	22.771	30.144	.004*
Create/Constr.	W	282.013		3.252	.145
	A	1,129.603	86.727	13.025	.018*
Non-cognitive	W	496.811		2.204	.226
	A	1,211.188	225.402	5.373	.074*
LANGUAGE					
No Speech	W	62.751		2.427	.204
	A	138.988	25.858	5.375	.074*
Social Speech	W	10.274		.350	.724
	A	60.888	29.349	2.075	.241
Response to Request	W	3.088		.944	.462
	A	19.741	3.271	6.035	.062*
Cooperative. Speech	W	29.471		1.459	.334
	A	60.831	20.201	3.011	.159
MATERIALS USE					
No Materials	W	251.008		2.489	.199
	A	1,865.321	100.864	18.493	.010*
Prescribed Use	W	285.703		6.249	.059*
	A	799.543	45.717	17.489	.011*
Inventive Use	W	28.941		.143	.871
	A	121.441	202.221	.601	.591
Idiosyncratic Use	W	279.174		1.000	.444
	A	758.084	279.174	2.715	.180
PEER INTERACTION					
Independent Activity	W	11.861		.053	.949
	A	6,351.004	222.841	28.500	.004*
Associative Activity	W	76.834		.755	.527
	A	983.174	101.794	9.658	.029*
Cooperative Activity	W	56.801		1.183	.395
	A	102.254	48.026	2.129	.235
No Evidence	W	54.703		.309	.750
	A	2,390.403	177.112	13.497	.017*

[1] Based on 2 and 4 degrees of freedom.

[2] W = within lesson variance; A = across lesson type.

* $f < .10$

but not insignificant amount of time reasoning. Higher order activity accounted for over 50% of cognitive functioning for older children during child-choice time.

TABLE 8

Variance of Behavior Within and Across Lesson Types: Older Children

		Mean Sum of Squares	Error	f[1]	Sign.
COGNITIVE FUNCTIONING					
Listen/Teacher	W[2]	8.968		.040	.961
	A	549.121	222.953	2.463	.201
Listen/Child.	W	170.028		2.031	.246
	A	817.258	83.736	9.760	.029*
Oral Recall	W	69.493		.962	.456
	A	44.503	72.207	.616	.584
Worksheets	W	58.321		.569	.606
	A	122.888	102.486	1.199	.391
Respond/Quest.	W	37.441		.870	.486
	A	234.698	43.021	5.455	.072*
Reasoning	W	.188		.377	.708
	A	9.149	.498	18.366	.010*
Choose from Alternatives	W	159.935		1.000	.444
	A	906.030	159.935	5.665	.068*
Non-cognitive	W	232.431		2.563	.192
	A	213.221	90.698	2.351	.211
LANGUAGE					
No Speech	W	468.324		1.460	.334
	A	980.434	320.811	3.056	.156
Social Speech	W	156.143		1.072	.424
	A	121.163	145.627	.836	.499
Recitation	W	131.160		2.930	.165
	A	151.410	44.770	3.382	.138
Response to Request	W	4.563		1.186	.394
	A	51.423	3.847	13.368	.017*
Cooperative Speech	W	17.080		1.000	.444
	A	219.040	17.080	12.824	.018*
Talks to Self	W	76.454		1.282	.371
	A	116.861	59.648	1.959	.255
MATERIALS USE					
No Materials	W	568.548		23.246	.006*
	A	3,709.868	24.458	151.685	.0001*
Prescribed Use	W	774.254		37.995	.003*
	A	3,228.618	20.378	158.438	.0001*
PEER INTERACTION					
Independent Activity	W	668.243		.966	.455
	A	2,068.830	692.063	2.989	.161
Get Teacher Assistance	W	5.320		1.000	.444
	A	19.360	5.320	3.639	.126
Associative Activity	W	134.668		.654	.568
	A	1,116.348	205.908	5.422	.073*
No Evidence	W	756.503		1.378	.351
	A	1,832.443	548.907	3.338	.140

[1] Based on 2 and 4 degrees of freedom.

[2] W = within lesson variance; A = across lesson type.

* $f < .10$

TABLE 9

Cognitive Functioning by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
COGNITIVE FUNCTIONING						
Non-cognitive	10.2%[1]	14.9%	46.2%	15.6%	26.6%	20.0%
Listen-teacher	42.5	11.6	5.9	29.4	27.1	5.1
Listen-child	32.5	11.2	8.2	33.8	9.8	2.3
Observe-illust.	.4	13.9				
Oral recall				9.8	11.8	4.5
Worksheet		3.3			2.4	12.1
Respond-quest.	10.2	29.9	.1	10.6	21.4	3.9
Respond-hints	1.8	.8	.8		.2	
Questioning	.4	.2	.1			.6
Volunteer	3.1	1.4	.6			
Reasoning		1.0	.3		.2	3.3
Choice/Altern.						43.4
Create/Construct		11.9	37.9			4.9

[1] The percentage of time each behavior was observed within each lesson type.

TABLE 10

Language Behavior by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
TYPE OF SPEECH						
No speech	93.1%	87.9%	79.6%	75.9%	57.3%	52.3%
Social speech		5.7	8.9	3.4	15.9	11.3
Recitation	.8	.2		12.1	21.2	7.2
Response/assist.	4.9	1.3	.1	7.8	.9	.3
Cooperative	.2	3.3	9.1			14.8
Inquiring	.5	.8	1.4		.2	1.0
Inventive	.1		.3			.2
Talking to self	.3	.8		.8	4.4	12.9

TABLE 11

Peer Interaction by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
TYPE OF INTERACTION						
Independent	%	17.1%	24.0%	.2%	17.9%	35.6%
Seek teacher help			2.8			4.4
Give peer help					1.4	
Associative act.		35.0	9.6	37.4		28.4
Cooperative act.		11.3	8.1			17.0
Parallel act.			55.5			
No evidence	100.0	36.6		63.0	80.7	14.6

The younger children appeared to engage in creating/constructing and non-cognitive activity about equal amounts of time. Whatever the behaviors might have been, the salient note about cognitive functioning in Type 3 lessons was that it included substantially greater amounts of higher order cognition than was observed in either of the other lesson types.

Language Behavior

The data for language behavior are presented in Table 10. For the younger children, the most striking observation was the absence of any speech in each of the lesson types (no speech: 93% in Type 1, 90% in Type 2, and 80% in Type 3). There was substantially more speech among older children but still less than fifty percent in each of the three lesson types (no speech: Type 1; 76%, Type 2; 57%, and Type 3; 52%). The dominant language modality in Type 1 and 2 lessons was recitation, as the structure in these lesson would suggest it would be.

Table 10 reveals a trend towards greater social and cooperative speech occurring for both groups of children an they experienced greater responsibility for pacing their activity (in Type 2 and 3 lessons). Furthermore, such speech appeared to be linked to activities which were not under the direct supervision of the teacher.

Peer Interaction

It is instructive to examine peer interaction in Table 11 in relation to language behavior for younger children. In Type 1 lessons, the structure precluded any peer interaction and language behavior was limited in the extreme. However, in Type 2 lessons there was substantial task related interaction (35% associative activitiy, 11% cooperative activity). Even though only small amounts of language behavior were observed, virtually all of it was related to peer interaction of one sort or another (5.7% social speech, 3.3% cooperative speech, and 1.3% in response speech). This pattern of increase in speech related to peer interaction was continued for the younger children in Type 3 lessons. Associative and cooperative activities diminished substantially (down from a combined 45% in Type 2 lessons to 18% in Type 3 lessons). However, there was an unusually high percentage of parallel behavior (56%) and a slight but seeming important increase in social, cooperative, and inquiring speech.

Peer interaction for older children was similar in some ways to that of the younger children. Type 1 lessons precluded peer interaction 63% of the time. The remainder was associative action but controlled by the teacher and the format of the lesson.

In Type 2 lessons the structure also precluded much interaction around tasks (81% no evidence, 18% independent activity). However, during independent activity, the chiliren did engage their classmates in substantial amounts of social speech (16%), perhaps while being off task. In Type 3 lessons, the older children made substantial contact with their peers (28% associative, 17% cooperative activity).

It should be noted that both younger and older children spent from one-fourth to more than one-third of choice time in independent action.

Materials Use

The data in Table 12 clearly reveal a relationship between lesson type and both the frequency and nature of materials use. This is especially true for the younger children where one can see an almost perfect correlation with few materials used in Type 1 lessons (95% no materials, 5% prescribed use) to materials being used 50% of the time in choice time and 37% of that in idiosyncratic and inventive ways.

The data for materials use by the older children also clearly indicates a lesson type relationship. However, these children tended to use materials in more conventional or prescribed ways than did the younger children. This may be accounted for by the fact that they used the computer during choice time and were often observed playing board games with one another.

Task involvement

Table 13 indicates, as mentioned earlier, some variance in on-task behavior across lesson types but substantial on-task behavior overall. The highest percentage of on-task behavior was observed in Type 1 lessons. However, note must be made of the fact that data for task engagement in large group, didactic lessons which require no materials manipulation by the children were taken by observing the visual attention and response behavior of the children. This may not provide one with an accurate estimate of actual engaged behavior.

It should also be noted that for the younger children task engagement decreased with the increase in their responsibility for directing their behavior. This was only partially true for the older children; there was a slight decrease under conditions of Type 2 lessons but an increase to 85% on-task behavior during choice time.

Profiles of Behavior by Lesson Type

Data were presented earlier indicating that children changed their behavior across lesson types. As important as these results are, the far more valuable information lie in descriptions of the nature of this behavior by lesson type. To address this a profile of behavior was drawn from all of the five categories of behavior for each of the three lesson types. These profiles were then contrasted, comparing the profile for each lesson with the other two lesson type profiles. Initially a separate profile was created

TABLE 12

Materials Use by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
TYPE OF USE						
No materials	94.5%	51.7%	50.9%	87.6%	29.2%	24.4%
Prescribed use	5.2	36.3	12.0	12.4	70.6	67.8
Open ended invent.		12.0	9.6			2.2
Idiosyncratic			27.5			
Combining						5.7
Abuse	.3					

for the younger and older children, but examination made clear that the descriptions within lessons were similar. Hence, a composite profile by lesson type for both age groups was created.

The results revealed three quite different behavioral profiles, each corresponding to lesson type. They are: (1) a *passive-responsive profile* for lesson type 1; (2) an *active-responsive profile* for lesson type 2; and (3) an *interactive-generative profile* for lesson type 3. The data from which these profiles were drawn are presented in Tables 9-13. Each profile was developed by analyzing behaviors in all five categories, (cognitive functioning, language, peer interaction, materials use, and task involvement), within lesson type for both younger and older children. A summary of the profiles is presented in Table 14.

The *passive-responsive profile* can be characterized as follows. The whole class sat facing the teacher (and one child for parts of some lessons). Interaction was typically linear in nature between the teacher and a child. Such interaction occurred in turns; individual children would be called upon to answer questions or offer comments.

TABLE 13

Task Involvement by Lesson Type: Younger and Older Children

	Younger Children Lessons Types			Older Children Lesson Types		
	1	2	3	1	2	3
On task	92.7%	86.5%	74.2%	86.7%	74.3%	85.3%
Off task	7.3	10.8	11.4	12.3	25.7	14.4
Transition		2.7	14.4			.3

TABLE 14

Characteristics of Behavioral Profiles.

I. *Passive Responsive Profile*:
1. Visual and auditory attention to the teacher in whole class, didactic instructional mode;
2. linear teacher-child interaction, one child at a time, invitations to respond;
3. no provision for child-child interaction;
4. no materials use by children; and
5. language is entirely the means of instruction.

II. *Active-Responsive Profile*:
1. Varied instructional format including large group didactic instruction, small group recitation, and independent seatwork;
2. limited linear teacher-child interaction, initiative and participation by the children encouraged in small group settings;
3. child-child interaction encouraged;
4. materials use required, active engagement with materials necessary; and
5. children responsible for pacing much of their activity.

III. *Interactive-Generative Profile*:
2. Children directing their activity, selecting from among the array of activities present in the classroom, responsible for pacing their activity;
2. higher order cognitive functioning behavior, creative, constructive behavior and selecting among alternatives and reasoning behaviors prominent;
3. materials use predominates, inventive constructive use of material; and
4. substantial amount of cooperative and associative activity, active social engagement.

There were no provisions made for child-child interaction. Children would visually and auditorially attend to the teacher (or in the case of authors, the child reading his/her paper) and respond only when invited to do so. Materials were generally not used by the children nor were they expected to manipulate those which may have been used by the teacher. Language was entirely the means of instruction.

The *active-responsive profile*, observed in Type 2 lessons, was considerably more varied than the *passive-responsive profile* observed in lesson Type 1. The variety of activities presented in Type 2 coupled with variation in instructional structure required active participation and even initiative on the part of the students. Often students were given instructions for tasks they were to complete independently of any direct teacher supervision. At other times they were organized in small instructional groups where both recitation and initiating responses were encouraged. Although the end-state or product of the lesson was determined by the teacher, children had to be active in responding to the lesson requirements in order to achieve success. Children used materials in these lessons, albeit most often in a prescribed way. This structure also provided for active engagement with other children in completion of some lesson tasks. This was especially true in the classroom with younger children.

The profile for Type 3 lessons is characterized as *interactive-generative*. The structure of choice-time in each classroom produced substantial variation in the ways in which children became engaged in cognitive functioning, language behavior, materials use, and peer interaction. Children sought engagement in activites in a cooperative or proto-cooperative modality. They demonstrated higher order cognitive functioning behavior uncommon in the other lesson types. They used materials more frequently and in a wider variety of ways than they had in the other two lesson types. And, some children made use of choice-time to seek assistance from the teacher on tasks related to other lessons. There was not a substantial loss in task engagement behavior, in fact for the older children the percent of on-task behavior was higher than in Type 2 lessons. The children were active in generating ways of engaging various features of their classroom environment.

It should be clear from these descriptions of the alternative behavioral profiles that children in each classroom changed their mode of interacting from one lesson type to another. Furthermore, they were able to make these shifts without special instructions on the part of the teacher, although one must recognize that some instruction in this regard must have occurred over the course of the school year. Nonetheless, it is important to note that the children easily perceived the profile expected of them in each lesson type and were able to meet the behavioral requirements without any apparent difficulty.

Discussion

This study was designed to investigate aspects of children's classroom behavior under different instructional formats. Three questions were asked: (1) Do children in the same lesson structure behave alike or different? (2) Do children change their mode of interacting as they move from one type lesson to another? and (3) Does there appear to be lesson type related effects on children's cognitive, language, mate-

rials use, peer interaction and task involvement behaviors?

The data make clear that questions 1 and 2 can be answered as follows: children behave much the same way in the same lesson and can readily shift their behavior to accommodate to a different lesson structure. In this sense, Barker's assertion regarding the coercion of setting is supported. This conclusion would appear to have profound meaning for teachers of young children both in terms of the selection of types of lessons provided for children and in the temporal and spatial design of the classroom.

Information from the analysis of the categorical behavior data, within and across lesson type, also has implications for teaching. The following are some we believe to be especially compelling. The first four statements are drawn from an analysis of categorical behavior across lesson type. The last three are drawn from the data taken from the behavioral profiles within lesson type.

1. *A relationship was observed between lesson structure and level of cognitive functioning.*

In Type 1 lessons, and to a lesser degree in Type 2 lessons, children's cognitive activity fell primarily at the lower end of the spectrum. They engaged in recitation, oral recall, providing answers to questions, and completing worksheets. However, when children chose their activity and were largely responsible for pacing their engagement, they tended to exhibit substantial amounts of higher order cognitive functioning. Under these conditions, they were observed creating and constructing, exploring alternatives, and engaging other children in cooperative and proto-cooperative activities. The evidence for higher order cognitive functioning may not have been as compelling as one would have liked, and certainly the range of behaviors was limited. However, the observed relationship between lesson structure and level of cognitive functioning ought to be noted.

2. *The absence of individual child speech was profound, even deafening.*

It can be accepted that classrooms for young children will have speech most of the time; language will be heard in these classrooms. However, it is important to note the nature of that speech. First, it is apt to be linear in the sense that it involves one child with the teacher, with children taking turns. The effect of this model of verbal interaction is that at any time most of the children in the classroom will be silent. Furthermore, under such conditions child-child talk is discouraged because it is perceived to be a lesson distraction. In Type 1 and 2 lessons, language is controlled by the teacher and is didactic in nature.

Second, social and cooperative, or task related, speech increased with changes in lesson structure in the same direction observed for cognitive functioning.

3. *Opportunity for peer interaction resulted in both substantial amounts of associative and cooperative activity as well as time spent alone.*

Clearly, increase in the opportunity to choose activities was linked to increased time spent in social and task related interaction with other children. However, younger children, either by choice or aptitude, appeared to have established fewer relat-

ionships with others during choice-time than did the olders. They spent substantial amounts of time off task and alone. One might suggest that teachers consider helping children learn more about what choice-time offers in terms of directing one's activity and becoming engaged with peers in cooperative and associative activities.

Observations of the older children during those times when they could direct their activity provide useful data. The older children engaged one or two other children in interactive group settings; rarely was their group size larger than three. This would appear to be valuable datum in informing teachers about children's perception of optimal group size and in the design of small group work spaces in the classroom.

4. *Materials were rarely used in structured lessons*

This may be a logical consequence of the logistics of large group instruction; it may be difficult to manage large group use of materials, although this may reflect conventional thought more than reality. Whatever the reasons may be, one ought to consider the effects of instruction entirely by language in light of the importance of manipulation of phenomena in contemporary learning theory. Related to this is the observation that much materials use in these classrooms was prescribed. It is not necessarily bad for children to be required to use materials in prescribed ways, as for example, in completing written exercises or performing measurement tasks. However, the ratio of prescribed to open-ended use of materials ought to be considered particularly because prescribed use, by definition, inhibits generative manipulation and higher order cognitive activity.

The following comments are related to the profile data.

1. *Barker's coercive effect was observed in this study*

Children behaved similarly within lesson types and altered their behavior in like ways from one lesson type to the next. Teachers ought to be aware of the ways in which lesson structure influences the responses children will make. It is entirely possible that lesson structure can preclude the achievement of lesson goals in ways that have nothing to do with the character or competence of the children.

2. *Children's accommodating to lesson types appeared to be done without difficulty or resultant inhibition of behavior*

Children did what was necessary for participation in each lesson type; they appeared to be adept at perceiving how they were expected to behave. Furthermore, their behavior within each lesson probably was functionally appropriate for each child in the study had been judged by the teachers to be an effective learner.

3. *Implications for the conventional interpretation of learning styles may be drawn from these data*

We would propose that each profile represents a functional learning style. If one can accept this proposition, we would further suggest that teachers and researchers consider the possibility that children may have multiple learning styles which they use as the learning context or their internal needs requires. Such a suggestion is not entire-

ly dissimilar from Gardner's notion of multiple intelligences (Gardner, 1983).

If this analysis is accurate, and more research would be needed to make that determination, one could envision young children having a wide repertoire of alternative learning styles each having functional value. One way teachers could accommodate to such a reality would be through the design of classrooms in which provision is made for the regular use of these alternative learning styles (Day, 1983).

This was a limited study of the relationship of young children's behavior to different lesson types. The study was informative for all the reasons just suggested. It must be noted, however, that one can only conjecture about the broader implications of this study; this study needs to be repeated in diverse school environments, with children who may be having difficulty with school, and with larger numbers of children. Notwithstanding, the data presented here help one understand context specific classroom behavior, something we need to know more about.

REFERENCES

Barker, R. J. (1968). *Ecological psychology*. Stanford, CA: Stanford University Press.

Bronfenbrenner, U. (1979). *The ecology of human behavior*. Cambridge: Harvard University Press.

Day, D. E. (1983). *Early childhood education: A Human ecological approach*. Glenview, IL.: Scott Foresman.

DeVries, R. (1987). *Programs of early education: The constructionist view*. New York: Longman.

Dunn, R. & Dunn, K. (1978). *Teaching students through their individual learning styles*. Reston, VA: Reston Publishing Co.

Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books Inc.

Garner, R. (1990). When children and adults do not use learning strategies: Toward a theory of settings. *Review of educational research*, **60**, (4), pp. 517-530.

Gregorc, A. (1985). *Inside styles: Beyond the basics*. Maynard, MA.: Gabriel Systems.

Gump, P. V. (1967). *The classroom behavior setting: Its nature and relation to student behavior*. Final report, U. S. Office of Education, Project no. 2453. Lawrence: University of Kansas.

Hall W. S., Scholnick E. K., & Hughes, A. T. (1987). Contextual constraints on usage of Cognitive Words. *Journal of psycholinguistic research*, **16**, 289-310.

Kogan, N. (1983). Stylistic variation in childhood and adolescence: Creativity, metaphor, and cognitive styles. In J. H. Flavell & E. M. Markham (Eds.), *Handbook of child psychology, Vol. 3: Cognitive development*, 4th Edition. New York: Wiley.

Oxford, R. L., Morrison, S. B., & McKinney, J. D. (1979). Classroom ecology and off task behavior of kindergarten students. *Journal of classroom interaction*, **15**, (1), 34-40.

Schoggen, P. Ecological psychology and mental retardation. In G. P. Sackett (Ed.), *Observing behaviors: Theory and applications in mental retardation*. Baltimore: University Park Press, 1978.

Smith, P. K. & Connolly, K. J. (1980). *The ecology of preschool behaviour*. Cambridge, England: Cambridge University Press.

Sternberg, R. J. (1990). Thinking styles: Keys to understanding student performance. *Phi Delta Kappan*, **71**, (5), 366-371.

Stodolsky, S. S. (1988). *The subject matters*. Chicago: University of Chicago Press.

Weinstein, C. S. (1977). Modifying student behavior in an open classroom through changes in the physical design. *American educational research journal*, **14**, (3), 249-262.

ACHIEVEMENT MOTIVE IN JAPANESE CHILDREN REVEALED BY PEER-AND SELF-RATING ON BEHAVIOR CHARACTERISTICS

Misako Miyamoto
Japan Women's University

This paper attempts to introduce the concept of achievement motive in Japanese children as shown through their behavior characteristics rated by peers and also rated by themselves, and the focus is mainly on the relation between achievement and affiliation. Although the studies were conducted more than twenty years ago and the subjects ranged from children to college studests, I shall report mostly the result's of the data on children found in our studies.

Concepts of Achievement Motive by McClelland and Atkinson

Japanese researchers started their work on achievement motive in the nineteen sixties. Among those, Hayashi (for example, Hayashi & Yamauchi, 1964), was one of the leading figures who had introduced the theories of achievement motive by McClelland et al.(1953) and Atkinson (1966). McClelland *et al.* defined achievement motive as the motive to attain "success in competition with some standard of excellence", to succeed in a "unique accomplishment", and to commit oneself to a "long-term involvement" (p. 110-114). Atkinson on the other hand postulated the "expectancy-value model." It specified that the strength of achievement motivation, or the tendency to achieve, is determined by the sum of two tendencies: one is the "tendency to approach success (T-s)" and the other is the "tendency to avoid failure (T-f). The strength of each of these opposing tendencies is determined by three components: i. e. "Motive x Probability x Incentive."

Child-Rearing Practices and Achievement Motive

As for the development of achievement motive, one of the sources is child-rearing practices.

Wintembottom (1958) reported that the mothers of sons (eight-year-old) with high "n-Ach" (abbreviation for "need for achievement," namely, score of achievement motive) tended to expect "self-reliant mastery" at earlier ages than mothers of sons with low n-Ach. The former group of mothers also placed fewer restrictions on their sons than the latter, but the restrictions they did insist on were to be observed at an earlier age. Even so, the self-reliance training was expected still earlier by these mothers. It preceded the age at which the restrictions were imposed. The boys were

Request for reprint should be addressed to Professor Misako Miyamoto at Department of Child Studies, Japan Women's University, Bunkyo-ku, Tokyo 112, Japan.

encouraged to master something.

The follow-up studies of the above research were conducted by some Japanese investigators (Hayashi *et al.*, 1964, Miyamoto *et al.*, 1967, Okuno, 1968). Some of their findings, however, are consistent, and some others contradictory. The Japanese mothers of children with high n-Ach also tend to expect "self-reliant mastery" at an earlier age than mother of children with low n-Ach, but they expect it at an earlier age than the mothers in the U. S. There were some differences in child-rearing practices depending on the child's gender, although the subjects of Winterbottom (1958) were only boys, and gender comparison was not possible for her study.

It is well known that Caudill *et al.* (1969) introduced the cultural differences in maternal care and infant behavior in Japan and America. They say that "..... the expression of the infant's biological needs, and the mother's basic caretaking of these needs are the same in both cultures; but beyond this, the styles of the infant's behavior and the mother's care are different. .... It is as if the American mother wanted to have a vocal, active baby, and the Japanese mother wanted to have a quiet, contented baby. In terms of the styles of caretaking of the mothers in the two cultures, they seem to get what they apparently want" (p. 31). "..... these patterns of behavior, so early learned by the infant, are in line with the differing expectations for later behavior in the two cultures as the child grows to be an adult" (p. 42).

In an interview report with Azuma and Gelman, Polman (1988) writes in *The Philadelphia Inquirer*, "..... the typical American child is the product of a two-income family, and is being raised in a culture that respects 'independence, individuality and tolerance for being different.' None of those traits is heavily stressed in Japan. 'To be able to profit from the Japanese way,' he (Azuma) says, 'the willingness to work just as a member of a group is indispensable.' Unlike the United States, Japan is a homogeneous culture. 'Ours is a culture of heterogeneity,' says Gelman, 'In Japan, people are more alike than they aren't. Here, people are more different than they are alike.'

What we need to consider here is how to understand cultural differences and underlying motivation instead of arguing right or wrong of the cultures. The present author has been interested in finding out the actual state of achievement motive of Japanese children.

Behavior Characteristics of Japanese Children Shown by Peer Rating

As the first step to find out the actual state of achievement motive in Japanese children, the author asked nineteen college students in a psychology class to think of a target person whom they judged as highly motivated for achievement. They were then asked to write down as many behavior characteristics of the target as possible. There were 163 items written down. Some of them were the kinds which coincide with the notion of achievement motive defined by McClelland *et al.* and/or Atkinson; however, there were some other kinds which were not included in the definitions of the previous studies. Among those which were not included were "being thoughtful of others," "being reflective," "being sensitive," "having a sense of humor," "being calm and composed," "enjoying work and studies," and so forth. (The survey was done in 1978, and there is no printed material for the results, but it is briefly mentioned in Miyamoto,

1981, pp. 5-6).

This result and the previous studies on the relation between achievement motive and affiliation motive done by the author and her collaborators (Miyamoto *et al.* 1975, 1987) inspired the author to carry on the next studies (Miyamoto, 1989a, 1989b). Whereas in the study of 1989a the test subjects were college students, in the study of 1989b, the respondents are fifth and eighth graders. The results of the study of 1989a showed that for the Japanese college students, social abilities, such as cooperativeness and social responsibility, tend to work with achievement motive. The author wanted to know whether the above results obtained with Japanese college students held true in Japanese children. This was the purpose of the 1989b study. Since this paper refers to children, here I shall report briefly the results only for the fifth graders.

Each subject (78 boys and 87 girls) was asked to choose two class mates of the same sex as himself/herself as targets. One was judged to be highly motivated to achieve and the other to be low motivated. The author will refer to them as "high" targets and "low" targets, respectively. The children were then requested to classify their two friends according to forty behavior characteristics selected on the basis of the results of a preliminary survey mentioned above. The definition of "highly motivated to achieve" was not explained to the children by the author in order to leave the concept of achievement motive to the children themselves.

As for the items in the high rank order of mean scores, there were the items which were related to challenge seeking, such as "making every effort," "willingness to accept challenging or difficult tasks," and so on, which coincided with the definition of the achievement motive as studied previously in the U. S. Noteworthy, however, is the fact that the item "taking social responsibility in collaboration" appeared within the first five items in the high rank order both for boys and girls, and the item "trying to work cooperatively" appeared for girls, which was related to the affiliative sense and was not found in the previous U. S. studies.

By applying the factor analysis, we found four factors for the boy targets, i. e., Factor I: challenge seeking and creativity, Factor II: social abilities and reflective attitude, Factor III: humor and acting according to his opinions, Factor IV: no fear of failure (Table 1).

For the girl targets, the two factors found were as follows, i. e., Factor I: challenge seeking and social abilities, Factor II: self-assertion and self-confidence (Table 2).

The results indicated that the behavior characteristics of Japanese target children with high achievement motivation, who were rated by peers, showed challenge seeking as the Americans do; and at the same time, social abilities, such as social responsibilities, trying to work cooperatively, and being sympathetic, tend to work with achievement motive. For the girl targets, the factor of challenge seeking is combined with social responsibility, as shown by factor analysis.

Relation Between Achievement Motive and Affiliation Motive

Previous studies on achievement motive and affiliation motive, conducted primarily in the U. S., have reported that the two motives either negatively correlated or had

TABLE 1

Results of the factor analysis of achievement motivation (5th grade boys N = 156)

Items	Factor I	Factor II	Factor III	Factor IV
7. carrying out	.77			
13. trying without fear	.74			
2. independence	.74			
8. persistence	.74			
32. self-assertion	.73			
17. expressing thoughts	.72			
25. intellectual curiosity	.71			
35. goal and plans	.67			
23. effort	.66			
34. trying new tasks	.65			
9. confidence	.64			
31. concentration	.64			
18. resourceful	.64			
10. creativity	.63			
39. efficient	.63			
15. challenge	.61			
22. leadership	.60			
3. examining references	.59			
30. listening to peers' opinions	.59			
1. good marks	.56			
21. without tension	.49			
▽ 5. fear of failure	.42			
16. not conceding	.38			
4. sympathetic		.69		
36. sensitive		.66		
14. social responsibility		.64		
38. seeking advice		.62		
6. cooperation		.61		
12. helpful		.61		
19. responsible for tasks		.59		
33. enjoying work		.59		
11. reflective		.58		
27. sound judgement		.57		
28. open-mind		.44		
20. humor			.69	
24. acting according to his opinions			.51	
26. pursuing interest			.42	
▽37. uneasy over trifles				.80
▽29. anxious when opinion differs				.56
Eigenvalue	18.34	1.66	1.33	0.99
Percentage of Variance	70.4	6.4	5.1	3.8
Cumulative Percentage of Variance	70.4	76.8	81.9	85.7

▽ Items scored in an opposite way.

Factor I : challenge seeking and creativity

Factor II : social abilities and reflective attitude

Factor III : humor and acting according to his opinions

Factor IV : no fear of failure

TABLE 2

Results of the factor analysis of achievement motivatien (5th grade girls N=171)

Items	Factor I	Factor II
2. independence	.83	
27. sound judgement	.83	
31. concentration	.83	
19. responsible for tasks	.81	
30. listening to peers' opinions	.81	
6. cooperation	.81	
14. social responsibility	.80	
3. examining references	.79	
23. effort	.78	
39. efficient	.78	
7. carrying out	.77	
8. persistence	.77	
35. goal and plans	.75	
11. reflective	.74	
22. leadership	.74	
36. sensitive	.74	
12. helpful	.73	
15. challenge	.73	
33. enjoying work	.72	
18. resourceful	.69	
38. seeking advice	.66	
17. expressing thoughts	.63	
34. trying new tasks	.60	
4. sympathetic	.59	
1. good marks	.58	
10. creativity	.57	
25. intellectual curiosity	.51	
28. open minded	.35	
32. self assertion		.66
9. confidence		.64
13. trying without fear		.61
16. not conceding		.50
24. acting according to his opinions		.42
20. humor		.36
▽29. anxious when opinion differs		.34
26. pursuing interest		.33
▽ 5. fear of failure		.32
21. without tension		.26
Eigenvalue	19.70	1.54
Percentage of Variance	77.5	6.1
Cumulative Percentage of Variance	77.5	83.6

▽ Items scored in an opposite way.

Factor I : challenge seeking and social abilities

Factor II : self assertion and self confidence

no relation to each other. The correlations of these studies were −.06 by means of projective technique by Atkinson *et al.* (1966), −.33 by means of questionnaire (EPPS) by Edwards (1954). Although Hidano (1970) got the negative correlation of −.30 for Japanese college students with the Japanese version of EPPS, other data by Miyamoto *et al.* (1975) in regard to Japanese junior high school students has shown a positive correlation between the two motives by means of projective technique (.39 for boys and .31 for girls). Doi (1982) has found that there are two dimensions of achievement motivation in the Japanese data; namely, affiliative and non-affiliative ones.

Here the present author reports her own study (Miyamoto *et al.*, 1987) on the relation between achievement motive and affiliation motive. The subjects were children and students from elementary school up to college level, numbering 413 in all; reference will, however, be made mainly to the brief results for children (48 boys and 47 girls).

In order to facilitate comparison with the results of previous studies, the definition of the achievement motive followed mainly after that of McClelland *et al.* (1953) mentioned earlier, with the exception of the notion of stressing competition. On the other hand, the definition of affiliation motive followed after that of Atkinson *et al.* (1954), i.e. the motive of concern over establishing, maintaining, or restoring a positive, affective relationship with other person(s).

As for the materials, the questionnaire and the projective technique were employed. For the questionnaire, by drawing on some previous studies, such as those of Edwards (1954), Mehrabian (1972), Kajita (1980), and others, a new questionnaire was developed with four subscales of ten items respectively. These subscales were: achievement motive (nAch), affiliation motive (nAff), self-concept of achievement behavior (cAch), and self-concept of affiliation behavior (cAff). Examples of the items are shown in Table 3. For the projective technique, the standard TAT measure was adopted, following after McClelland et al. (1953) for the achievement motive, and also following after Atkinson *et al.* (1954) for the affiliation motive.

TABLE 3

Examples of the questionnaire items

Questionnaire-Achievement motive (Q-nAch)		
	If I could choose a task ·····	
I'd prefer a significant one even one that I might fail in.	always usually usually always	I'd prefer an easy one which might not be significant.
Questionnaire-Affiliation motive (Q-nAff)		
	When I feel dejected ·····	
I'd rather be with others.	always usually usually always	I'd rather be alone.
Questionnaire-Self concept of Achievement behavior (Q-cAch)		
When I work with difficult tasks, somehow I can get over them by myself.	always usually seldom not-at-all	
Questionnaire-Self concept of Affiliation behavior (Q-cAff)		
I'm loved by the people around.	always usually seldom not at all	

TABLE 4

Correlation coefficients among variables

subjects	Q nAch × Q nAff	Q nAch × Q nAff	Q nAch × Q nAff	Q nAch × Q nAff	P nAff × P nAff	P nAch × Q nAch	P nAch × Q nAch	P nAch × Q nAch	P nAch × Q nAch
5th graders	.21*	.53***	.28**	.30**	.18*	.27**	.21*	−.06	−.03
8th graders	−.14	.61***	.51***	.44***	.25**	.08	.08	.14+	.04
senior highs	.02	.40***	.25*	.41***	.21*	.17+	.09	−.15	−.07
college	−.01	.49***	.34***	.25*	−.02	.12+	.11	.17*	−.02
total	.01	.52***	.38***	.34***	.16***	.15***	.15***	.05	−.01

+p<.10 *p<.05 **p<.01 ***p<0.01 Q=questionnaire P=projective technique
nAch=achievement motive, cAch=self concept of achievement behavior
nAff=affiliation notive, cAff=self concept of affiliation behavior

As Table 4 indicates, children showed significant positive correlations between achievement and affiliation, both for motive and for self-concept. The college group showed no relation between the two motives but showed significant correlation between the two self-concepts. The 8th graders' and senior high students' scores showed no relation between the two motives by questionnaire, however they showed significant correlation between the motives as assessed by the projective technique, and between the self-concepts, as assessed by questionnaire. From the above relation between the motives of achievement and affiliation, we see that the children obtained a significant positive correlation, and as for the data on the self-concept of the two traits as obtained by the questionnaire, all groups showed significant positive correlations.

Ausubel (1968) stated that achievement motivation has at least three components, namely: cognitive drive, ego-enhancement, and affiliative component. He said that affiliative drive is most prominent during early childhood, when children largely seek and enjoy a derived status based on dependent identification with their parents (pp. 375-376). The results of the above study coincide with this notion. That is, Japanese children with high n-Ach scores also have high n-Aff scores, and they prefer working with others to working alone.

As was mentioned earlier, Doi's study (1982) found an affiliative achievement motive in the Japanese data, and the previous study by Miyamoto *et al.* (1975) indicated that the achievement motive and the affiliation motive were positively correlated in Japanese subjects.

According to Dweck's model in "Motivational processes affecting learning" (1986), the particular goals, "performance goals" or "learning goals," which children pursue in cognitive tasks, shape their reactions to their success or failure. Children who have "performance goals" seek to gain favorable judgments. If the goal is to obtain a favorable judgment of ability, the children need to be certain their ability is high before presenting it for judgment. And so, individuals with a high assessment of their ability may sacrifice learning opportunities that involve risk of error in preference for opportunities in which they can look smart. Thus, a performance goal appears to promote defensive strategies that can interfere with challenge seeking. If I apply this model to the above results, it may seem that the Japanese children who have both high n-Ach scores and high n-Aff scores may be anxious to gain favorable judgments in

order to establish favorable social relations. Unfortunately, this may be true for some children who are in the midst of preparing for the ill-reputed entrance examinations; however in general, to prefer working with others to working alone does not necessarily means they seek to gain favorable judgment. For, though as previously thought in western societies where high n-Ach is not accompanied by high n-Aff, and though Dweck's model suggests high n-Aff may interfere with the learning goal, the above data showed the Japanese students had both high n-Ach and high n-Aff. For the Japanese children, the high n-Aff did not in fact interfere with the learning goal. The ability to seek challenge is therefore not inhibited by the group oriented approach.

In the lecture "Learning and adjustment: the importance of intrinsic motivation" given at the thirty-third annual convention of Japanese Association of Educational Psychology (1991), Deci presented the notion that intrinsic motivation is based in three fundamental, innate psychological needs. They are the need for competence, the need to feel related and the need for self-determination (or autonomy). He stated that ".... when children feel secure with significant others, when they feel related and involved, they will be more adventuresome and initiating. It is also the case that through their relationships with parents and teachers, children learn to value what those adults, and society more generally, value. For example, there are many activities that children do not find interesting or fun but are important for effective functioning. If the children can learn to value these activities or outcomes by encountering them in optimally motivating conditions, they will be more willing to engage in the activities freely. Thus, relatedness (in addition to autonomy support and competence promotion) is a critical factor for children's internal motivation and positive feelings about school and about themselves."

At this point, it can be said that if the achievement motive is to work intrinsically, the affiliation motive or relatedness may be helpful. In that sense, a mother's loving attitude as well as her expectations of independence and mastery for children, especially for young children, will promote the achievement motive of children.

The illustration is speculative and immature, but the studies introduced in this paper confirm that, for Japanese children, social abilities as well as challenge seeking can work together.

REFERENCES

Atkinson, J. W., Heyns, R. W. & Veroff, J. (1954). The effects of experimental arousal of the affiliation motive on thematic apperception. *Jornal of abnormal and social psychology*. **49**, 405-410.

Atkinson, J. W. (1966). Motivational determinants of risk-taking behavior. In J. W. Atkinson & N. T. Feather (Eds.), *A theory of achievement motivation*. New York: Wiley. 11-48.

Atkinson, J. W. & O'Connor, P. (1966). Neglected factors in studies of achievement-oriented performance. Social approval as incentive and performance decrement. In J. W. Atkinson & N. T. Feather (Eds.), *A theory of achievement motivation*. New York: Wiley. 299-325.

Ausubel, D. P. (1968). *Educational psychology*. New York: Holt.

Caudill, W. & Weinstein, H. (1969). Maternal care and infant behavior in Japan and America. *Phychiatry*. **32**, 12-43.

Doi, K. (1982). A two dimensional theory of achievement motivation: Affiliative and non affiliative.

Japanese Journal of Phychology. **52**, 344-350. (In Japanese)

Dweck, C. (1986). Motivational processes affecting learning. *American Psychologist*. 41, 10, 1040-1048.

Edward, A. L. (1954). *Edwards personal preference schedule*. New York: Psychological Corporation.

Hayashi, T. & Yamauchi, K. (1964). The relation of children's need for achievement to their parents' home discipline in regard to independence and mastery. *Bulletin of Kyoto Gakugei University*. Series A, 25, 31-40.

Hidano, T. *et al.* (1970). *EPPS personality test*. Tokyo: Nihonbunkakagakusha. (In Japanese)

Kajita, E. (1980). *Psychology of self concept*. Tokyo: Todaishuppankai. (In Japanese)

McClelland, D. C., Atkinson, J. W., Clark, R. A., & Lowell, E. L. (1953). *The achievement motive*. New York: Appleton-Century-Crofts.

Mehrabian, A. (1972). *Nonverbal communication*. New York: Aldine. Miyamoto, M. (1981). *Pshchelogy of achievement motive*. Sogensha. (In Japanese)

Miyamoto, M., Yoda, A., Hatano, G., Okano, K. & Fukai, Y. (1967). The relation of children's need for achievement to their mothers child-rearing practices. *Thirty-first annual convention of Japanese Psychological Association, Abstracts*. p. 130. (In Japanese)

Miyamoto, M. & Kato, C. (1975). The relation between achievement motive and affiliation motive. *Japan Women's University Journal (Home Economics)*. **22**, 23-28. (In Japanese)

Miyamoto, M. 1981 *Psychology of achievement motive*. Sogensha. (In Japanese)

Miyamoto, M., Ochiai, T. & Kato, C. (1987). The relation between achievement motive and affiliation motive. *Japan Women's University Jornal (Home Economics)*. **34**, 1-6.

Miyamoto, M. (1989a). The concept of achievement motive among Japanese college students through the behavior characteristics. *Japanese Psychological Research*. **31**, 2, 80-91.

Miyamoto, M. (1989b). Behavior characteristichs of Japanese children who are rated peers to have high achievement motive. *Tenth biennial meetings of ISSBD, Abstracts, Symposia and special events*. p. 60.

Okuno, S. (1968). A study on children's achievement motive (I) —— The relation of children's need for achievement to their parents' child rearing practices. *Thirty-second annual convention of Japanese Psychological Association, Abstract*. p. 78. (In Japanese)

Polman, D. (1988). An eastern educator on the western way. *The Philadelphia Inquirer*. May 15.

Winterbottom, M. R. (1958). The relation of need for achievement to learning experience in independence and mastery. In J. W. Atkinson (Ed.) 1958 *Motives in fantasy, action, and society*. Van Nostrand. 453-478.

JAPANESE AND AMERICAN MOTHERS PERCEIVING AND EVALUATING THEIR 5-MONTH-OLD INFANTS' EMOTION EXPRESSIONS: A CROSS-CULTURAL PERSPECTIVE

Yuko Kanaya
Kokugakuin College
Donna L. Bradshaw
The Japan Society of Boston
Joseph J. Campos
University of California, Berkeley
Kazuo Miyake
Kawamura Gakuen Woman's University

This study was carried out as a part of a Japan-US longitudinal, comparative study on emotional socialization in infancy. Forty-three Japanese mothers and 15 American mothers were interviewed in their own homes. Their perceptions and evaluations of the infants' emotion expressins were examined. There were considerable cross-cultural similarities in the perceptions of basic emotions and uncomfortable emotion expressions. Mothers in both cultural groups answered that infants' negative expressions were uncomfortable for them. An examination of the data reveals that the two cultures differed in the extent to which they emphasized different emotions. The Japanese viewed *amae* as emotions and the Americans perceived frustration as emotion. With regard to emotion control, Japanese mothers tended to view patience and resignation as control. By contrast, American mothers viewed distraction as control. These results suggest that cultural differences in mothers' perceptions and evaluations of infants' emotion expressions may produce different styles in expression regulation.

Key words: infant emotions, mother's perceptions, culture, socilaization of emotion

---

This research was supported by grants from the Ministry of Education, Science and Culture (No. 60301011, Principal investigator: Kazuo Miyake), and Japan Society for the Promotion of Science (US-Japan Educational and Cultural Cooperative Research: Principal investigator: Kazuo Miyake) as well as by a grant for maternal and child health from the Ministry of Health and Welfare.
We express special thanks to Dr. Rosemary Campos (University of California, San Francisco) and Marcia Fleener (University of Illinois), for data collection in America. We are also grateful to Mayumi Matsumoto, Chiaki Nakamura and other research group members of Hokkaido University for data collection in Japan.
Requests for reprints should be addressed to Yuko Kunaya, Kokugakuin College, Takikawa, Hokkaido, 073, Japan.

Campos *et al.* (1987, 1989) have outlined new approaches to emotional development. They have also suggested important domains for future research regarding the function of emotions, the adaptive behavior-regulatory effects of different emotions, action tendencies associated with different emotion families, the developmental course of social emotions, socialization factors influence children's style of responding to these social emotions, and the function of emotional language. These are some of the many questions that deserve further study.

From cross-cultural studies, evidence in favor of the universality of certain emotion expressions have been yielded. But Izard (1980) has suggested that cultures differ in their display rules, the cultural norms and conventions regulating affective expression. As Sommers (1984) stated culuture seem also to differ in their way of experiencing, perceiving, and evaluating various emotions. Malatesta and Haviland (1985) examined the thesis that the emotion words of a culture exert a powerful influence on the actual experience of emotion. The study of Geertz (1959) has shown that Javanese adults exercise strong control over their emotion expressions. Caudill and Weinstein (1969) have found different practices in American and Japanese groups early in life. Solomon (1978) reprted the rarity of anger among the Utku Eskimos. Lutz (1985) revealed that cultural values of the Ifaluk people of Micronesia stress nonaggression, cooperation, sharing, and hierarchical behavior.

The foregoing studies on emotional development and the relationship between culture and emotion are very suggestive for our research. The present study was carried out as a part of Japan-US longitudinal, comparative study. We focused on socialization of emotion and development of emotional regulation. We have already found some trends towards similarities in maternal behavior (Kanaya et al., 1987, 1989). Those results suggest mothers' role of modulator of their infants' negative and positive emotion expressions. It would be worthwhile trying to ask the mothers about their perceptions to see if there were any dramatic differences in how American mothers view emotional development in comparison with what we know about Japanese mothers' views.

METHOD

Subjects

The Japanese sample consisted of 43, 5-month-old infants and their mothers living in Sapporo, and participating in a longitudinal study of emotional socialization. The American sample was composed of 15, 5-month-old infants and their mothers from middle-class families residing in Champaign, Illinois. The American pairs also were the participants in a longitudinal, Japan-US comparative study. Japanese mothers' avarage age is 27.4 and their avarage years of schooling is 14. American mothers' mean age is 30.5, and their mean schooling years is 15.5.

PROCEDURE

Emotion Interview

The 5-month home visit consisted of at least 90 minutes (60 minutes in the united States) of naturalistic observation followed by 5 brief experimental procedures.

Usually 3 people went to the home, 2 camera persons and 1 exprimenter/interviewer. Mothers were interviewed about their perceptions of their infants' emotion expressions. The interview was included while the infant was taking a nap. If the infant's nap was too short to finish the interview, we finished it just before leaving after the other data had been collected. One camera was assigned to film the mother's face and gestures. The interviewer filled the answers in the emotion questionnaire form.

Interview Questions

The main part of the interview concerns mothers' perceptions and evaluations of their infants' emotions and is similar to Emde, Klinnert et al's questionnaire/interview. The interview questions were developed by Donna Bradshaw after the research members have discussed how to translate English emotion words into Japanese and what to ask to get some hint about cultural differences.

The interview questions analyzed here were as follows:

Q1. Can you list for us the emotions your baby has shown since he/she was born?

Q2. I want to ask you how each emotion is shown, at what age it is shown, and in what situations it is elicited. (Mothers were asked to go into details about her responses to Q1, and then about other emotions which were not mentioned spontaneously. Happiness, anger, sadness, fear, surprise, disgust, interest, displeasure, shyness, shame, and guilt were emotions to be asked.)

Q3. What emotions does your baby show that make you feel particularly uncomfortable? (Is it ever a problem for you or your husband if your baby shows any of these emotions?)
   (a) In your home?
   (b) Outside the home?

Q4. Does it bother you if the baby gets emotionally aroused?

Q5. Does your baby show evidence that he or she can control his or her emotions? How do you know this?

RESULTS

(1) *Perceived emotions*

Responses to each question were analyzed separately. First, the response distribution for Q1 was tabulated revealing the number of subjects in both cultural samples who named emotions their infants showed. As can be seen in Table 1, basic emotions (happiness, anger, sadness, surprise, disgust and fear) were referred not only by Japanese mothers but also by American mothers. The majority of mothers in both cultural groups perceived happiness and anger as their infants' emotion expressions. Japanese and American mothers also referred to interest, displeasure, pain and hunger. When answers to Q1 and Q2 were combined, shyness and shame emerged.

An examination of the data reveals that the cultures differed in the extent to which they emphasized different emotions. The Japanese viewed *amae*, complaining (the infant wants his mother to pay attention to him), and demanding (the infant wants to be held by his mother) as infants' emotion expressions. The Americans vi-

TABLE 1

Response Distribution for Q1 (in percentages) : Can you list for us the emotions your baby has shown since he/she was born?

Emotions	Japanese (N=43)	Americans (N=15)
Happiness	56(100)	100(100)
Anger	79(95)	73(73)
Sadness	26(67)	40(53)
Surprise	26(98)	13(*)
Disgust	16(95)	27(*)
Fear	7(47)	53(*)
Interest	5(98)	20(*)
Displeasure	16(91)	7(*)
"Amae"	28	0
Frustration	0	87
Contentment	0	33
Excitement	0	33
Affection	0	13
Shyness	0(47)	7(13)
Shame	0(5)	0(7)
Guilty	0(0)	0(0)
Pride	0	7
Complaining (wants attention)	5	0
Demanding (wants to be held)	5	0
Pain	19	7
Hunger	7	13
Boredom	0	13
Tiredness	0	7

N. B.: The numbers in parentheses indicate percentages when answers to Q1 and Q2 were combined. "*" represents missing data.

ewed frustration, contentment, excitement, affection, pride, boredom, and tiredness as infants' emotion expressions.

(2) *How shown, age shown, and eliciting circumstances*

Responses to Q2 are summarized in Tables 2-1 and 2-2, and Figures 1 and 2. It is apparent that there was considerable cross-cultural agreement in ways of perceiving happiness, anger, sadness, disgust, fear, surprise, interest, and shyness (see Tables 2-1 and 2-2). Examining the mothers' descriptions of what situations they see the emotions in, we find that the same situations as "when left alone too long" were repeatedly applied to different emotion expressions. In American sample, sadness or frustration will be elicited, while in Japanese sample, anger, sadness, displeasure, or *amae* will be elicited. As shown in Table 2-2 the mothers judged their infants' different emotion expressions from face, voice, limbs, and body. It was difficult for most of the mothers to retrospect to the age shown. As shown in Figures 1 and 2, there were cultural differences in perceiving the age shown. American mothers attributed various emotions to infants from the newborn period to the age of 4 months. While Japanese mothers

TABLE 2-1

Responses to Q2 : In which circumstances was each emotion shown ?

Japanese	Emotions	Americans
	〈Happiness〉	
playing with M/ peek-a-boo/ tickling/ talking to/ smiling to/ held by M/ when F returns/ when recognizes F, GM/		playing with M or F/ M's songs/ talking to/ smiling to/ held by M/ when F returns/ when recognizes parents/ when put in a bath tub/
	〈Anger〉	
hunger/ can't sleep/ when left alone too long/ when placed in a baby seat/ can't satisfy a demand/ want M to go on holding/ want M to pay attention to/		hunger/ tiredness/ can't sleep/ dirty diaper/ frustrated/ when placed in a car seat or walker/ when lying in bed doesn't want to sleep/ when left with a baby sitter/ when sib pounces on
	〈Sadness〉	
when left alone/ want to pay attention to/ when M won't come long time/ disapperance of M/ when M speak roughly/ M's sad face		hunger/ tiredness/ want to pay attention to/ when left alone
	〈Disgust〉	
changing clothes/ bottle feed/ when wiped face/ when carried on M's back/ unusual posture too long/ sib's interruption/ when given solid food/		when given medicine, disliked or solid food, pacifier or a bottle/ licks fingers in mouth/ tired and get objects that are not interesting/
	〈Fear〉	
loud voice/ sudden voice/ unexpected noises of toys/ suddenly picked up and rocked/ strange, unusual appearance of M or F/ presence of stranger/ sib's aggression/		unexpected noises/ loud noises/ offer children's cries/ fell off bed/ suddenly picked up in M's arms/ when left with GM/ presence of stranger/
	〈Surprise〉	
loud noises/ ringing telephone/ sneezing/ suddenly talked to or suddenly someone appeares/		loud noises/ new toys/ when the dogs come close/
	〈Interest〉	
new toys, objects, or persons/ person's face when he is speaking/		new toys, or objects/ new situation (lights)/
	〈Displeasure〉	
hunger/ want of sleep/ sleepiness/ sickness/ dirty diaper/ heat/ unknown causes/ want M to pay attention to/		playing when the baby is tired/
	〈Amae〉	
just before breast feeding/ when wants to be held/ when wants to play with M/ when M leaves/ when the baby is sleepy, he(she) looks at M/ playing alone, and M appears/		have not noticed
	〈Frustration〉	
have not noticed		hunger/ tirednes/ awkward position/ tired of position/ bored/ can't reach for what he(she) wants/ when left alone too long/ doesn't want to be held by sib
	〈Shyness〉	
stranger talks to/ held by F/ F talks to/ someone looks into/ when looks at an unfamiliar baby/ when praised by M or F/		person approaches her when she is being held by M/ people in general/

TABLE 2-2

Responses to Q2: How was each emotion shown?

Emotion		Face	Voice	Limbs	Body
Happiness	(J)	smiles	playful voice laughs	flaps limbs	
	(A)	smiles	happy voice laughs	kicks legs, arms out	
Anger	(J)	frown redden face	cries, growls screams	throws a toy	squirms
	(A)	redden face	cries, squeals growls, screams	clinches fists arms fly away	wriggles, thrashes
Sadness	(J)	lips go down weeping eyes	weeps, whimpers feeble, nasal voice	reaches for M (wants to be held)	
	(A)	lips go down, pouting face, wrinkles face	cries whimpering cry		turns head from side to side
Disgust	(J)	make a wry face shuts mouth	cries, screams	wave hand negatively	turns face away shakes head throws head back
	(A)	wrinkles face frown, open mouth make a wry face			
Fear	(J)	startled	suddenly cries bitterly	quiver	stiffen
	(A)	holds breath startled	cries, screams	clinches fists draws legs up	
Surprise	(J)	eyes bigger	suddenly cries swallows voice	startle	startle
	(A)	eyes bigger blinks	smiles/laughs/cries depends on situation	startle, arms fly up	moves head back
Interest	(J)	stares, earnest look	pleasant voices laughs	reaches	
	(A)	stares, wide eyes opens mouth		reaches maniputaltes	turns head to objects
Displeasure	(J)	sullen shuts mouth	frets, doesn't stop crying		
	(A)	screws up face	whimpers, cries		
Amae	(J)	tearful smile	nasal voice, whines, cry for M		clings to M, wants to be snuggled
Frustration	(A)		fussing, screams complaining cry growling, tense voice	clinches fists hand stiffens tenses limbs	banging on table
Shyness	(J)	smiles and looks down, smiles and averts	utter "a" sound and look down		buries head into M's shoulder
	(A)	smiles and nuzzles to shoulder			buries head into M's shoulder

BEST COPY AVAILABLE

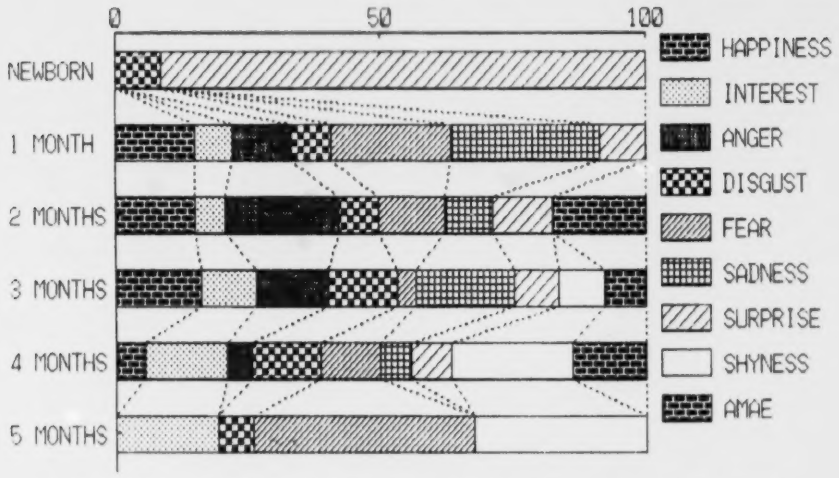


FIGURE 1 Japanese Mothers' Responses to Q2: When was each emotion shown?

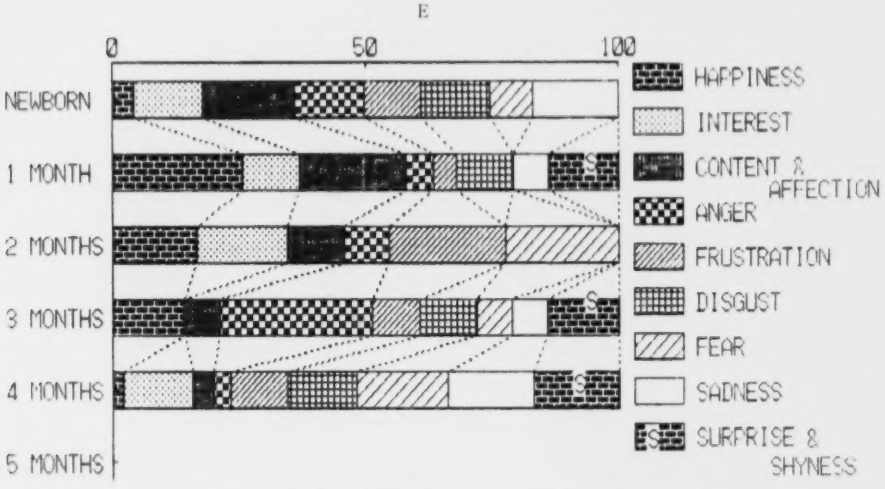


FIGURE 2 American Mothers' Responses to Q2: When was each emotion shown?

attributed various emotions to infants from the age of 1 month to 5 months. American mothers were found to be more likely to classify positve emotions in comparison with Japanese mothers.

(3) *Uncomfortable emotion expressions*

As can be seen in Table 3, a fairly large number of mothers of both cultural groups answered "Yes" to the question about uncomfortable emotion expressions in the home. We find that fussing and crying (displeasure) were treated by Japanese mothers as uncomfortable emotion expressions. Japanese mothers were found to be significantly more likely to perceive nothing uncomfortable outside the home in compar-

TABLE 3

Response Distribution for Q3 (In percentages): What emotions does your baby show that make you feel uncomfortable?

		Japanese (N=42)	Americans (N=15)
In the home	None	38.1	40.0
	Yes	61.9	60.0
Outside the home	None	73.1	40.0
	Yes	26.9	60.0

ison with American mothers ($\chi^2=5.55$, $P<.025$). As can be seen, Japanese mothers' response to the question about uncomfortable emotion expression outside the home forms sharpest contrast with the response to the same question in the home. American mothers showed the same tendency both in the home and outside the home to treat their infants' crying and screaming (anger or frustration) as uncomfortable emotion expressions.

As for Q4, no significant differences were found between Japanese and Americans. They were not bothered by their infants' aroused emotion except negative expressions.

(4) *Emotion Control*

Concerning emotion control, a large number of mothers in both cultural groups could not say for certain whether their 5-month-old infants control their emotions or not. Some mothers viewed infants' finger sucking as evidence of control, and others did not. As shown in Table 4, about 40 percent of Japanese mothers and half of Amer-

TABLE 4

Response Distribution for Q5 (In percentages): Does your baby show evidence that he/she can control his/her emotions?

	Japanese (N=43)	Americans (N=14)
Yes	39.5	50.0
No	60.5	50.0

TABLE 5

Mothers answered "Yes" to Q5: Evidece of controling emotions (In percentages)

	Japanese (N=17)	Americans (N=7)
(1) In order to stop bad feeling		
(a) distract oneself by seeing a new object	11.8	42.9
(b) be quiet down by finger sucking	17.6	0.0
(2) Being bored or being in a good mood entertain oneself by an object; play by oneself; pay attention to mother, a new stimulation or one's environment	11.8	57.1
(3) Crying situation Be ready to cry, but repress one's tears;cry oneself out with resignation	58.8	0.0

ican mothers answered "Yes" to this question. Examining mothers' evaluations of infants' emotion control, we can find cross-cultural differences (see Table 5). Most American mothers tended to view distraction as control, while Japanese mothers showed a fairly strong tendency to evaluate patience or resignation as control.

DISCUSSION

We found cross-cultural differences as well as similarities in mothers' ways of perceiving their infants' emotion expressions. Many writers have suggested that the range and quality of emotional experience is potentially the same for all human beings. However this potential range becomes altered in various ways, so that certain qualitative aspects are attenuated, emphasized, or embroidered upon (Malatesta & Haviland, 1985, p. 110). Lutz (1985) has argued that there may be major differences among cultures in criteria used in evaluating emotions. Levy (1984) has described how cultures *hypocognize* certain emotions and *hypercognize* others. According to Doi (1973), *amae* is a special emotion word of Japanese which means one's desire to accomplish proximity to others and incorporation with them. It is a key concept for understanding social relationships of Japanese. Our results suggest that Japanese mothers were very sensitive to their infants' *amae* or similar emotional behavior to *amae* (e.g. crying, demanding, or complaining). They used many kinds of expressions to describe infants' crying. They tend to interpret their infants' crying as a request for holding, or as an expression of loneliness. They feel pity for their infants. In other words, *amae* is a hypercognized emotion which is woven in Japanese cultural scripts. By contrast, no American mothers referred to such emotional behavior by using the English equivalent of *amae*. For the Americans, *amae* may be a hypocognized emotion. They showed a strong tendency to perceive frustration which is analogus to anger. Compared with Ameican mothers, Japanese mothers made no distinction between frustration and anger. Sommers (1984) pointed out that Americans were distinguished from the other cultural groups in expressing a strong preference for concealing anger or inhibiting its expression (p. 330). This finding was interpreted as showing that Americans fear that an open expression of anger may lead to a negative outcome in the person's relations with others. However on the other hand they treated anger as useful and constructive to experience. So American mothers may be very sensitive to their infants' expressions of anger and frustration.

As Izard and Malatesta (1987) have discussed, cultural differences in socialization produce different styles of expression regulation. Our exploratory interview questions about uncomfortable emotion expressions and emotion control gave us a good hint on cultural differences in socialization. Japanese and American mothers showed different attitudes toward infant crying outside the home. Japanese may have a tendency to connive at infant negative expressions before the public. On the contrary a large number of American mothers showed the same attitude both in public and private. American infants may have to deal with their anger earlier than Japanese infants. In connection with these results, it is worth noting Miyake et al's research with the strange situation procedure (1985). They have reported that the percentage of ambivalent-resistant attachment type was much higher in Japan than in America. This result

provided indirect evidence for the differential effects of socialization on emotion expression and emotion regulation.

Although Japanese infants' ambivalent-resistant behavior in the strange situation can be interpreted as the expressions of the reverse side of *amae* to their mothers, from the viewpoint of the Westren individualism such behavior can not be permitted. Probably the Americans expect their children to cope with frustration by themselves and transform it into positive emotions earlier than the Japanese do so. Does Japanese special emotion of *amae* facilitate infant emotion regulation? Does it inhibit development of self? What role does it play in personality development? These are questions that deserve further study.

REFERENCES

Barret, K.C. & Campos, J.J. (1987). Perspectives on emotional development II: A functional approach to emotions. In J.D. Osofsky (Ed.), *Handbook of infant development*, Second Edition. 494-554, Wiley-Interscience.

Campos, J.J., Campos, R.G., & Barrett, K.C. (1989). Emergent themes in the study of emotional development and emotion regulation. *Developmental Psychology, Vol. 25*, No. 3, 394-402.

Caudill, W. & Weinstein, H. (1969). Maternal care and infant behavior in Japan and America. *Psychiatry*, **32**, 12-43.

Doi, T. (1973). The analysis of dependence. Tokyo: Kodansha International.

Geertz, H. (1959). The vocabulary of emotion. *Psychiatry*, **22**, 225-237.

Izard, C. (1980). Cross cultural perspectives on emotion and emotion communication. In H.C. Triandis & W. Lonner (Eds.), *Handbook of cross cultural psychology, Vol. 3*, Boston: Allyn & Bacon.

Izard, C. & Malatesta, C. (1987). Perspectives on emotional development I: Differential emotions theory of early emotional development. In J.D. Osofsky (Ed.), *Handbook of infant development*, Second Edition. Wiley-Interscience.

Kanaya, Y., Bradshaw, L.B., Nakamura, C., & Miyake, K. (1988). Expressive behavior of Japanese mothers in response to their 5-month-old infants' negative and positive emotion expression. *Annual Report 1986-1987*, **No. 10, 55-59**, Research and Clinical Center for Child Development, Faculty of Education, Hokkaido University.

Kanaya, Y., Nakamura, C., & Miyake, K. (1989). Cross-cultural study of expressive behavior of mothers in response to their 5-month-old infants' different emotion expression. *Annual Report, 1987-1988*, **No. 11, 25-31**, Research and Clinical Center for Child Development, Faculty of Education, Hokkaido University.

Levy, R. (1984). Emotion, Knowing, and culture. In R. Shweder & P. Ekman (Eds.), *Approaches to emotion*. Hillsdale, NJ: Erlbaum.

Lutz, C. (1985). Cultual patterns and individual differences in the child's emotional meaning system. In M. Lewis & Saarni, C. (Eds), *The socialization of emotions, Genesis of behavior: Vol. 5*, Plenum.

Malatesta, C.Z. & Haviland, J.M. (1985). Signals, symbols, and socializaiton: The modification of emotional expression in human development. In M. Lewis & Saarni, C. (Eds), *The socialization of emotions*. **89-116**. *Genesis of behavior: Vol. 5*, Plenum.

Miyake, K., Chen, S., & Campos, J. (1985). Infant temperament, mother's mode of interaction, and attachment in Japan: An interim report. In I. Bretherton & E. Waters (Eds.), *Growing points of attachment theory and research: Vol. 50. Monographs of Society for Research in Child Development*, **276-297**.

Sommers, S. (1984). Adults evaluating their emotions: A cross-cultural perspective. In C. Z. Malatesta, & C. E. Izard (Eds.), *Emotion in adult development*. 319-338. Sage Publications, Inc.

Solomon, R. C. (1978). Emotion and anthropology: The logic of emotional world view. *Inquiry*, 21, 181-199.

EMOTION ATTUNING SYSTEMS : ITS MICRO-ANALYSIS IN INFANCY AND EARLY CHILDHOOD

Osamu Suda
Tokyo Metropolitan University

Abstract

In the Japanese tea-ceremony, in the Eucharist of the Catholicism, or in the contemplation of Zen practice, we can see sequential acts. These activities are composed of postural, imaginative, or breathing forms. Within these self-quieting activities, there are secret skills to introduce the emotion into quiet and consoled state.

It is recently that developmental psychologists are beginning to show a great interest in emotion attunement or emotion regulation (Campos & Barrett, 1984 : Campos, Campos & Barrett, 1989). However there are a variety of ways to grasp this phenomena.

Today systems view proposes a basic framework for explaining this phenomena : the child is assumed as a behaving system which flexibly seeks to attune emotional state. Here "system" involves the bio-informational-behavioral interplay, which is composed of three components : the organized overt acts (i.e. emotion expression), physiological emotional state, and subjective feeling which is expressed in the language report (Lang, 1984 : Lewis & Michalson, 1983).

Suppose that a child is placed in the stress-arousing context. He/she is assumed to attune his/her emotional state by resorting to a number of behavior elements : coping with an interference or self-quieting over-activated state, etc (Suda, 1991). These behaviors are observed even in the very young infant (Suda, in preparation), and they develop with age when the child acquires new behaviors.

Therefore, I will define emotion attunement as micro-process to self-generate a quieter state where a new cluster of behaviors emerges. This micro-process, which means real-time change, is named "self-organization" implying autonomic process of generating a state or a pattern of behaviors without prescription or a set of commands in the child's structure.

This phenomena involves a wide range of activities. It includes at least four characteristics. (1) A shift of emotional state is not seen as a point along continuum of behavioral activation, but rather seen in emergence of discrete state where a new and motivationally different series of behaviors are seen. (2) There are two sides in an attuning process ; modulating an unpleasant state and activating a quiet state. The child is to resort to what he/she can operate and try to find an appropriate state of

Request for reprint should be addressed to Dr. Osamu Suda at Department of Psychology, Tokyo Metropolitan University, Minami-osawa, Hachi-oji, Tokyo 192-03, Japan.

emotion. (3) In process of interpersonal interaction, the pattern is flexibly determined by the conditions between two persons. (4) Emotion attunement develops with age. Acquiring new repertoire of behaviors, such as emergence of language, resets the way that the child resorts to. Accordingly this produces a different microprocess of emotion attunement.

A new theory, self-generating model of the behaving system provides a more progressive perspective on the explanation of a structure and its flexible shift in emotion attunement. Now the infant or young child is beginning to be viewed as a self-generating system. This view rejects an idea that the system is static, or is assembly of independent behavior elements that are determined by initial prescription or formation rules.

"Self-organization theory", or dynamic systems view, is proposing a new framework for explaining how a new phase stems from instability of behaviors. This is a new perspective on child development, which are originally born in the field of Physics, Biology or other natural sciences (e.g., Prigogine & Stengers, 1984). This theory is being introduced to developmental psychology, especially to the field of the motor skills, for example emergence of walking from stepping (Thelen & Ulrich, 1991), and infant communication (Fogel & Thelen, 1987). These researchers are explaining how "a now form" of behavior emerges. However this theory is applicable to a wide range of developmental phenomena, because the theory is composed of a set of general principles.

Thus I will apply its limited principles to the field of emotion attunement. This paper therefore aims to recast this theory and to point out the significance of this framework.

1. Today's Understandings of Emotional Development

A new and most distinctive feature in the recent researches is, I believe, the hypothesis of mind in young infants. Though there is a long history that researchers have believed emotion is undifferentiated continuum at the beginning of life, and that it differentiates into a number of segments when the child acquires the language or cognition.

But it is widely accepted today that the young infant can display many emotions. Different and distinct facial expressions are displayed in the interpersonal interaction, which is reported in infants at six to eight weeks of age (Traverthen, 1979 : Campos, Barrett, Lamb, Goldsmith, & Stenberg, 1983). At this age, eight basic emotions are assumed as innate systems (Campos & Barrett, 1984). Accordingly, researchers are beginning to assume discrete emotions in the young infants.

Izard (1984) has assumed discrete emotion systems for displaying overt behaviors, each of which serves for inherent adaptive functions from very young infancy. This is called differential emotion theory. In this theory, the emotion is believed as separate organismic systems, which are organizers of overt emotional behaviors. "As indexes of discrete emotional state", action tendencies are proposed (Campos & Barrett, 1984). For example "avoidance and retreat have been used to index fear" (ibid.).

Here we can see a new understanding about action and action tendencies. "By action and action tendencies, we do not necessarily mean responses with a distinctive morphological structure" (Campos, Campos, & Barrett, 1989). But rather, "action tendencies" implies the preparation to execute flexibly a family of motor behaviors which are morphologically different but functinally the same (Campos, Barett, Lamb, Goldsmith, & Stenberg, 1983; Barrett & Campos, 1989). To explain action tendencies, an alternative view is proposed by the self-organization theory, where the initial state is assumed to generate nonlinear process that shifts into a new sate (Fogel & Thelen, 1987).

Now we will turn to developmental data. Discrete emotional systems are becoming to be assumed to display the child's internal states even in very young infanty. Traverthen (1979) presumed that even young infant is able to express his/her emotional state. He believed that the infant was able "to exhibit to others at least the rudiments of individual consciousness and intentionality". He called this ability as "subjectivity".

In the early infant-adult communication, the young infant aged two months is able to display "Affective self" to the adults (Suda, 1991). Expressed emotional state is mind-read by adults. "Affective self" is the adults' initial perception about the infant's emotional minds. So, the infant's emotional expression is regulator of the tempo and intensity of interactive respose in the adult (Gianino & Tronick, 1988).

A dramatic phase shift in infant communication emerges in the later half of the first year of life. It begins, I believe, at around six months of age or older, after the period the infant acquires creeping or crawling. The infant of this stage begins to be perceived as "Noetic self", because the acts he/she execute begin to be read by others as displaying intention (Suda, 1991). The message from the infant is now perceived as meaningful in this stage. Then, later the child is going to expresse his/her intention by using signals and symbols.

Piagetian psychologists have assumed that this intentionality is based on the means-end differentiation which emerges after eight months of age (Frye, 1981). In this stage, the infant begins to use a means to attain a goal that he/she sets. If an obstacle exists, he/she is now able to change the means into a more appropriate one. This is the emergence of a new intentionality, which will provide the capability to use tools or signals.

The child is now selecting the means to attain an expected impact on the environment. To do so, he/she must be aware of his/her actions and their impacts. And, to monitor the sequence of the behavior and to control it, he/she needs to refer to some standard action rules (Carver & Scheire, 1985). Action rules are a set of rules or policies to provide decisions at the sequential points of script-based actions (Abelson, 1981). Action rules are the knowledge to execute a motor program.

The child will increase the capability to control his/her actions with acquisition of action rules. In the emotion attuning process, action rules are the standard to canalize socially acceptable actions. A cluster of action rules are therefore programs where society's standards of do or don't-do are reconstructed. Social experience is the source for the child to construct this knowledge (Suda, 1991).

Thus the emergence of intentionality has been viewed as feedback-loop of information processing, as I referred to above. Until today the intentionality has been assumed as the output of information processing. However, intentionality may be viewed in an alternative way: that is , as the output of the dynamic systems which stems from the development of emotional and motor systems as well as from that of the cognitive-information system.

The self-organization theory proposes this dynamic view. In this theory, intentionality is viewed as self-generation of behaving system. Emotion is an organizer of this process. Thus the role of the self-organization theory is to cast a new emphasis on dynamic systems process, which may explain the real-time process of the behaving system.

2. Emotion Attuning Model

Now I will recast a few principles of the self-organization theory into a new framework for understanding of the child's emotion attunement. The role of this paper is to apply this perspective to the micro-process in the stress-arousing context. While in many articles, basic concepts of the this theory are explained in details (e.g., Thelen, 1989: Thelen & Ulrich, 1991).

It is notable that this theory involves two perspectives to view the behaving structure and developing structure: that is, as explanation of a structure, and as that of its genetic process. These perspectives are necessary to explain how a new system of emotion attunement emerges.

A) Self-Organizing Process

Analyzing the video-taped data, one can presume the real-time process where the child is attempting to attune internal states. The micro-analysis describes this process based on real-time sequential data. The behavior systems fluctuate and develop in micro-genetic level.

For instance, an infant less than two months of age seeks and tries to suck the mother's nipple. Sets of behavior patterns and reflexes, such as finger sucking, are switched on to modulate over-activation (Suda, in preparation). The two-year-olds are also found to resort to coordinative patterns of behaviors under stress-arousing context (Suda, 1986).

In the stressful context, the child generally resorts to a variety of behaviors. Some coping behaviors are observed as direct expression of emotional state, such as display of angry face, while some are more instrumental or intentional actions such as a threat or calling the mother. On the other hand, most of self-quieting or consoling behaviors are observed as touching or stimulating his/her own body (Freedman, 1977: Suda, 1987).

This process was explained with hypothesized model of underpinning biological structure. An example was given in the tension-reduction hypothesis, where the researchers assumed the cyclic shift of gaze at mother and gaze-aversion (e.g., Fogel, 1982). Other researchers attempted to adopt a feedback-loop model or inter-domain-regulation hypothesis (e.g., Lewis & Michalson, 1983: Campos & Barret, 1984: Carver

& Scheire, 1985).

However the self-organization theory is replacing the explanation by a new emphasis on behaving and developing process. A new framework is that the child is assumed as a flexible system which self-organizes the process of generating new emotional state.

There is not any specific prescription or command center assumed to predetermine the self-organizing process (Thelen & Ulrich, 1991). This process is not determined by initial conditions but rather by boundary conditions which the systems meet with at the final changing process (Prigogine & Stengers, Japanese translation, 1984, P. 178, P. 188, P. 200). In the human emotion system, boundary conditions involve a variety of variables: adult's response, social context or task. They include also, I believe, internal boundaries: morphological structure, sensory-motor feedback system, etc. (cf. Thelen & Ulrich, 1991, P. 24,: Suda, 1991). Emotion is, I assume, like a cloud which configurates its new state or behavioral pattern when it meets with the ocean or the mountains.

In the self-organizing process, the initial state, where the activated child is expressing fluctuated behaviors, can self-organize to generate a new state. This is named as a phase shift, which implies a seemingly discontinuous transition, shift to a discrete emotional state where a new and different cluster of behaviors emerges. Within a emotional state, a number of morphologically different but functionally displaceable behaviors are expected to emerge (Suda, 1986). Thus the self-organization is often seen as nonlinear process.

When the infant is one or two months of age, he/she is expected to change easily from one state to another (Suda, in preparation). For instance, the infant sometimes exhibiting sad face in the small cradle, sometimes expressing happiness. However, when the child is at the age of three years or older, he/she comes to exhibit increasingly stable and unchangeable state (Suda, 1990). At those ages, I believe, the child comes to attune emotional state to meet with social context, by resorting to more refined motor skills and script knowledge stored in himself/herself.

B) Attractor State

Supposing a genuine biological system, it is sure that emotion attunement in the stress-arousing context is essential for the child's biological survival. So, the system pursues microprocess of self-stabilizing into emotional equilibrium. This stabilized state into which a phase shift appears is called as "attractor state" (Thelen, 1989). The child's emotional system will settle into stabilized state "from a number of initial states and will tend to return to its attractor regimes when perturbed" (ibid, P. 85).

However when the child is placed in the open system, for instance the child being interacting with mother, the regulation seen in micro-process is expected to proceed different process from that seen in the child as an isolated system. There will be an increasing possibility for generating a variety of attractor states. Unexpected and alternative state is to emerge in such cases: sometimes it is difficult for mother to soothe her irritated infant.

C) Interpersonal Process

There is a growing interest in the interpersonal perspectives to account for emotion regulation (e.g., Campos & Barrett, 1984).

Supposing interpersonal interplay, for example an infant vocalizing in mother's lap, the multiple levels of behaviors between the two may generate an interactive system. This open system has a wide range of potential possibilities within which the child's new state will be self-generated. The infant perceives the circumstance and shift emotion into a new state. Some children are flexible to attune oneself, while some are vulnerable against the distress-arousing context. In this process of generating a new state, we can expect a variety of solutions, since this shift in the behaving system is often assumed as nonlinear process (Thelen & Ulrich, 1991). Here is, I assume, background to accept developmental relativism: difference in the form of behavior within an individual or between individuals.

We may see a conceptual idea that qualitative changes emerge in emotional regulation (e.g. Salovey & Rodin, 1985). However self-organization theory casts an emphasis on bottom-up approach, in which the process of how the system is attuned to generate a new state is explained with specific and descriptive data of each shift point (Thelen & Fogel, 1989). And it also provides an explanation of its morphological variation among individuals.

In the distress regulation context, the mother tries to coordinate her supports to generate a new interaction pattern (Thelen & Fogel, 1989). Generally these efforts help the child's emotion attunement. The child's behaving system initially exhibits irritable state, where a number of morphologically different but displaceable behaviors are executed. However, this fluctuation is often led to flexibly organize a new interaction pattern with the mother's aids. Sometimes an aggressive state stems from this phase shift, sometimes a self-quieting state. This shift is guided without any prescription.

In my observation, the infant before two months of age resorts to a large number of behaviors and reflexes: such as reflexes relating to postures, self-stimulating behavior such as finger sucking, facial expression, vocalization such as crying or laughing, or activation of stepping responses etc. In the later half of the first year, the action tendencies emerge in the child's behavior repertoire. Though action tendencies sometimes include intentional and instrumental behavior elements, they reflect emotional state and play the similar function to other behaviors within the emotional state.

As pointed out in the recent article, emotion is the organizer of actions (Campos & Barrett, 1984). The emotional state spread within the whole system may interplay with the high-level activities at central nervous system. Thus a shift of emotional state is presumed to regulate the intentional behavior or action tendencies. However, researchers of cognitive development have neglected the explanation of interplay between emotion and cognition untill recently.

The child interact with the person directly before the earlier half of the first year. However mediator of interaction will change with increasing age.

3. Understanding Real-Time Process in the Child

A) Descriptive Data Reconsideration

Today bottom-up study is becoming more easy to handle, so the role of descriptive data is becoming more important in the developmental research. Its fruitfulness is revaluated firstly in exploring a new theory.

Recent innovation of video-recording systems and development of computer soft wares for micro-analysis greatly facilitate research.A frame-based analysis is prevalent in recent articles. In the field of emotion regulation, data describing the real-time shifts are necessary for us to understanding the child's behaving system.

The descriptive data will present a concrete profile of each child. Understanding of a behaving system is based on this type of data. Estimation of the distance from the standard of the population is often invalid to realize the child's behaving system. But rather, the data on the detailed real-time process is necessary in explaining a hidden structure, since functional interplays of behaviors often fluctuate to organize the wholistic adaptation process of an individual. So, I believe, it is important to evaluate the role of analyzing and explaining the real-time data of the child's behaving system in self-organization theory.

B) Emotion Education In Autonomic System

According to an anthropological report, Bedouins believe that life is composed of three components: that is working, playing and resting (Katakura, 1985). They believe that selfquieting activities, namely "resting" is the most important matter of their life. "Resting" here refers to staying with family, meditation, praying to God, composing a poem, sleeping etc.

Our life is guided by the beliefs like this. The knowledge about the emotion system is important for parents. The data may canalize the parents' acts at the stress-arousing context. Parents therefore require reliable knowledge, and try to correct the way they interact with the child. In this sense, a family is assumed as an autonomic system for emotional education.

If we recall the idea suggested by George Kelly (1955), we can believe that ordinary parents collect appropriate data and analysis to regulate their acts towards child's emotional process. If they can access only the data about the averages features, they will not realize the variation of emotion attuning activities which the child generates through non-linear process.

To realize the concrete nature of the child's emotion, knowledge about structure are meaningful for the parents. The content of the child's interplay of behavior patterns, and explanation of the shifts between system in emotional systes are coming to increase the importance as a proposing knowledge.

For example, we already have the following idea about the development of interaction. However we do not have idea about real-time process and its structure:

In the neonate period, the parent and the infant begin to regulate mutually their interplaying acts. In this dyadic process, infant emotional behavior is direct expression of his/her internal state. So, the parents may assume "affective self" in the infant. But how the infant changes their behavior in the process of emotion attunement?

At the later half of the first year of life, the infant comes to organize a triadic relationship among infant, object, and adult. Traverthen & Hubley (1978) pointed out

that it begins with the increase of infant's interest in objects in the communication context. The infant begins to manipulate a thing then later symbols to share reference to it with the other. The " noetic self " is assumed in the child's intentional acts by the parents. At this stage, the infant also begins to express intentional behaviors during the process to attune his/her emotion. We have abstract idea about that, but how the child regulate himself/herself in the real-time process? Self-organization model will propose a framework for describing these phenomena.

REFERENCE

Abelson, R. P. (1981). Psychological status of the script concept. *American Psychologist*, **36**, 715-729.

Barrett, K. C. & Campos, J. J. (1987). Perspectives on emotional development II: A functionalist approach to emotion. In J. D. Osofsky (Ed.) *Handbook of infant development*, second edition. N. Y.: Wiley.

Campos, J. J., & Barrett, K. C. (1984). Toward a new understanding of emotions and their development. In C. E. Izard, J. Kagan, & R. B. Zajonc, (Eds.) *Emotions cognition and behavior* Cambridge: Cambridge Univ. Press.

Campos, J. J., Barrett, K. C., Lamb, M., Goldsmith, H. H., & Stenberg, C. (1983). Socioemotional development. In P. H. Mussen (Ed.) *Handbook of child psychology*, fourth edition, Vol. II. N. Y.: Wiley.

Campos, J. J., Campos R. G., & Barrett, K. C. (1989). Emergent themes in the study of emotional development and emotion regulation. *Developmental Psychology*, **25**, 3, 394-402.

Carver, C. S. & Scheire, M. F. (1985). Self consciousness, expectancies, and the coping process. In T. M. Field, P. M. McCabe, & N. Schneiderman (Eds.) *Stress and coping*. Hillsdale, N. J.: Lawrence Erlbaum.

Fogel, A. (1982). Affect dynamics in ealy infancy: Affective tolerance. In T. Field & A. Fogel (Eds.) *Emotion and early interaction*. Hillesdale, N. J.: Lawrence Erlbaum.

Fogel, A. & Thelen, E. (1987). Development of early expressive and communicative action: Reinterpreting the evidence from a dynamic systems perspective. *Developmental Psychology*, **23**, 6, 747-761.

Freedman, N. (1977). Hands, words, and mind: On the structuralization of body movements during discourse and capacity for verbal representation. In N. Freedman & S. Grand (Eds.) *Communicative structures and psychic structures: A psychoanalytic interpretation of communication*. N. Y.: Plenum Press.

Frye, D. (1981). Developmental changes in strategies of social interaction. In M. E. Lamb & R. S. Sherrod (Eds.) *Infant social cognition*. Hillsdale, N. J.: Lawrence Erlbaum.

Gianino, A. & Tronick, E. Z. (1988). The mutual regulation model: The infant's self and interactive regulation and coping and defensive capacities. In T. M., Field, P. M., McCabe, & N. Schneiderman (Eds.) *Stress and copinig across development*, Hillsdale, N. J.: Lawrence Erlbaum.

Izard, C. E. (1984). Emotion cognition relationship and human development. In C. E. Izard, J. Kagan, & R. B. Zajonc, (Eds.) *Emotions cognition and behavior*. Cambridge: Cambridge University Press.

Katakura, M. (1985). Children's play and labor: Through the cases in the Arab. In K. Iwata (Ed.) *The original images in the child culture: From the viewpoint of cultural anthropology*. Tokyo: N. H. K. (In Japanese)

Kelly, G. A. (1955). *The psychology of personal constructs*. N. Y.: Norton.

Lang, P. (1984). Cognition in emotion: concept and action. In C. E. Izard, J. Kagan, & R. B. Zajonc

(Eds.) *Emotion, cognition, and behavior*. Cambridge: Cambridge University Press.

Lewis, M. & Michalson, L. (1983). *Children's emotion's and moods*. N. Y.: Plenum Press.

Prigogine, I. & Stengers, I. (1984). *Order out of chaos*. (Japanese transtation. Tokyo: Misuzu Shobo.)

Salovey, P. & Rodin, J. (1985). Cognition about the self: Connecting feeling states and social behavior. In P. Shaver (Ed.) *Self, situation, and social behavior*. Beverly Hills: Sage Publication.

Suda, O. (1986). The frustration management in two year old children. *Jimbun Gakuho* **183**, 51-64. Tokyo Metropolitan University. (In Japanese)

Suda, O. (1987). A sudy of frustration management in two year old children. Paper presented at the 51th congress of Japanese Psychological Association, 458.

Suda, O. (1990). The content analysis of the child's utterance: The study of frustration processes in 4 or 5 year olds. *Jimbun Gaku ho*, **214**, 45-60. Tokyo Metropolitan University. (In Japanese)

Suda, O. (1991). Development of emotion regulation systems: Theoretical consideration of the child's activities. *Jimbun Gakuho*, **233**, 77-96. Tokyo Metropolitan University. (In Japanese)

Suda, O. (in preparation) Coordination of nipple seeking behavior in young infancy.

Thelen, E. (1989). Self-organization in developmental processes: Can systems approach work? In M. R. Gunnar & E. Thelen (Eds.), *Systems and development*. Hillsdale, N. J.: Lawrence Erlbaum.

Thelen, E. & Fogel, A. (1989). Toward an action based theory of infant development. In J. J. Lockman & N. L. Hazen (Eds.) *Action in social context*. N. Y.; Plenum Press.

Thelen, E. & Ulrich, B. D. (1991). Hidden skills. *Monographs of the Society for the Research in Child Development*, **223**, 56, 1.

Trevarthen, C. (1979). Communication and cooperation in early infancy: A description of primary intersubjectivity. In M. Bullowa (Ed.) *Before speech*. Cambrige: Cambridgde University. Press.

Trevarthen, C. & Hubley, P. (1987). Secondary intersubjectivity: Confidence, confiding and acts of meaning in the first year. In A. Lock (Ed.) *Action, gesture, symbol: The emergence of language*. N. Y.: Academic Press.

THE MICROGENESIS OF GRAPHIC REPRESENTATION IN CHILDREN

Shing-jen Chen
Hokkaido University

The task of picture drawing was analysed in terms of the nature of children's perception and their understanding of the instruction. It is suggested that the drawing task should be understood as a problem-solving task, and that a picture thus drawn is the result of a series of problem solvings, each of which is exercised within a deminishing possibility resulted from the accumulation of previous steps. Children's drawings contain unintended result of problem-solvings. Observations of children refusing to draw under some conditions, and of the perceptual conflict during a drawing task of an 8 year old boy were reported. Analysis of these observations showed microgenetic process of perceptual confiict and emergence of new skills in graphic representation.

Key words: action, children's drawing, microgenesis, perceptual conflict, problem-solving.

I. INTRODUCTION

Children's picture drawing can be approached from various angles. In connection with the motor skills necessary in drawing, the related issues of the development of prehension or grasping has been the focus of interest for developmental researchers since the early period (e.g., Halverson, 1931; Ames, 1948). However, modern research on children's drawings seems to focus mainly on the cognitive-perceptional aspect. This includes the constructional (or process) aspect of picture drawing (Thomas and Silk, 1990). There is relatively little research on the motor skills of children's picture drawing.

One motive underlying the attention on the topic of children's drawings is in their relevance to the understanding of the process of cognitive and representational development. Another concern of the researchers is the expectation that investigation on this subject may produce practical advice for art education of young pupils, normal or otherwise. Furthermore, children's drawings have also been studied from what has been termed the "clinical-projective" approach. While these considerations and viewpoints can be identified in the not very long history of the subject (see Freeman and Cox, 1985, Harris, 1963, and Thomas and Silk, 1990, for more comprehensive reviews), and therefore, representing more successful and fruitful aspects of the subject, not much attention has been focused on what I would call the phenomenlogy of drawing as

Requests for reprint should be addressed to Dr. Shing-jen Chen, Department of Developmental Psychology, Faculty of Education, Hokkaido University, Sapporo 060, Japan.

problem-solving and of the interpretation of drawing.

In this paper, I am going to discuss the issue of children's perception of the drawing task. That there is something peculiar to the perception of this task by children around the ages of 5 and 6 can be shown by the observation that under some conditions children sometimes fail to draw completely; the task being rejected as impossible. In such a situation, while it seems natural for the researcher to modify his/her task so that at least the child can be persuaded to draw, the very act of modifying the task has the effect of abolishing the opportunity for allowing the problem in question to appear! In this paper, I suggest that the children's inability to draw under such a situation implies something special about the children's perception and interpretation of the drawing task, the understanding of which would shed light on our understanding of children's drawings. I propose to address to the issue by making an exploratory analysis of the structure of the drawing task. Furthermore, although the significance of this issue (or further understanding of it) is yet to be explored, it is my belief that it would add something to, not only our understanding of childen's drawings, but also to our understanding of the development of children's perception of events.

II. PICTURE DRAWING TASK AS COMPLEX ACTION AND PROBLEM-SOLVING

Barrett, Beaumont and Jennett gave a descriptive example of what happened during the picture drawing task for children to show how the process of picture drawing was not a simple affair (1985, p. 176). Indeed, there are a large number of decision-makings to be made in accomplishing the task. In this paper, the drawing task is to be considered as a problem-solving process, and the behaviour of the children in producing the picture is to be analysed as a series of goal-oriented action.

So long as the meaning of the term "action" can be agreed upon as having the invariant characteristics of "goal-directedness" and "conscious planning" (Valsiner, 1987, p. 145), the process of producing a picture can be viewed as action. In what follows the picture drawing task will be analysed and illustrated from this point of view. In addition to these intra-personal aspects, the importance of an inter-personal aspect, the process of negotiation between the subject and the experimenter who is present, will be emphasized.

A. Goal-directedness

Whether the child is producing a picture out of his/her own will, or is being asked by a researcher to do so, the child can be said to have a goal. In the former, a child has his/her own idea of what to achieve, although he/she might have obtained the idea by observing other children, or simply by remembering one such incident. In terms of the actual execution, he/she might have to organize the environment so that the necessary materials are available for use, instead of having them prepared, or even specified, by other people. In contrast, in the case when the child is asked to draw a picture, a goal is bing introduced from outside the child. The understanding of the researcher's words or instruction constitutes a necessary step in having the goal. Needless to say, the specific form of the goal thus obtained depends on how the instruction is being interpreted. The goal can be self-produced; it can be adopted from outside, such as being "forced" by the experimenter. Once adopted, the goal has to be

monitored and compared with current state so that behaviors can be organized toward its realization. In other words, during the execution, subgoals or sub-stepts have to be planned and carried out, the resulted performance be compared with the set goals. In case of mismatch between set goals and current state, correction or adjustment has to be implemented.

B. Planning

The task of picture drawing usually takes place in limited time and space. In terms of time given, the task usually has to be carried out within a certain limit of time during which several "parts" have to be executed in sequence. Human figure drawing, for example, consists of drawing different parts of the body which has to be done one by one within the time given for the task. In terms of spece, the different parts of the human figure have to be represented and arranged within the limit of a paper of a definite size either given by the researcher or chosen by the drawers among available ones.

C. Negotiation between the subject and the experimenter

The picture drawing task usually takes place in a social situation, with the experimenter giving instruction and the subject trying to meet what he/she is supposed to perform. As the details of how a session is conducted and how the task is to be carried out are either not the main interest of the researcher, or are specified or "controlled", they do not appear to be problematic in research conducted in the empiric-positivistic tradition. However, as will be illustrated in the later part of this paper, the task situation includes occasions where the subject's negotiations with the experimenter occur. What is called negotiation here includes occasions such as when the subject alters the direction of the paper from what was first given, or when the subject asks questions concerning details not anticipated by the experimenter. The subject might even make unfavorable judgement on his/her performance which results in the subject's rejection of some or all parts of the picture produced. How these details are negotiated depend not only on the personal factors which are not apparent, but also on the nature of the control the researcher has designed for the study.

D. Unintended by-products

As it is unusual to think of children's picture drawing a from an analytical point of view, it is perhaps not obvious to an ordinary observer that the drawing task involves at least the following steps: (1) producing some kind of image(s) as an answer to and as a result of interpreting the task instruction, (2) planning what (kind of line, of shape) and where (within the paper) to execute on the paper, and (3) arranging these steps in sequence. However, while planning seems necessary and inevitable, once non-optimal planning is implemented, there is no absolute criterion or constraint to prevent the child from continuing. The result may be a "strange" or "childish" picture, but in the child's mind, there is no absolute standard by contrasting with which the child is arrested from executing whatever he/her has in mind. In other words, children have a very great tolerance for many varieties of drawings; they are

not critical of their own solutions. As a result, children's drawings contain not only the first solution to whatever is perceived and interpreted as the primary problem in the drawing task, but also the subsequent solutions to other problems which are engendered, or modified, by the first solution. The first solution often creates unintended by-products which constraint subsequent solutions.

III. PERCEPTUAL CONFLICT DURING DRAWING TASK : A CASE STUDY

Among children of the ages of 5 and 6, the task of drawing three-dimensional object is sometimes rejected as being impossible. This has been observed when the object presented was relatively large, for example, a box about 25 cubic cm. Children refuse to draw the object for reason such as "It is too big", or "The paper is too small" (when the size of the paper provided was 16×30 cm, or larger). (Note). Another observation to be mentioned is the tendency of younger children in producing a picture of colour patches, presumabaly corresponding to the shapes and colors of the various faces of the object.

These events tend to be overlooked or treated as "incorrect" response of the children that is unexplainable, and usually categorized as one of the primitive classes. However, these events and an additional observation made about the conflict shown by a normal 8 year old second grader (to be described below) give the impression that children bring with them something additional to the task of drawing object that they have direct experience of handling. And it is this additional something that causes problem in carrying out the drawing task.

A. The task

The task given to the 8 year old boy was to draw, "as seen", three objects separately; a cylinder (diameter=5 cm, h=6 cm), a cone (diameter=6 cm, h=10 cm), and a tetragonal pyramid (5×5 square cm, h=9.6 cm). All the faces of the objects were in different colors. The object was placed to his left, about 90 cm away from him, and about 45 degrees below his eyes (Figure 1). He was given 4 sheets of paper (21×29.6 cm). The whole process was video-recorded and the following descriptions and analyses are based on this record.

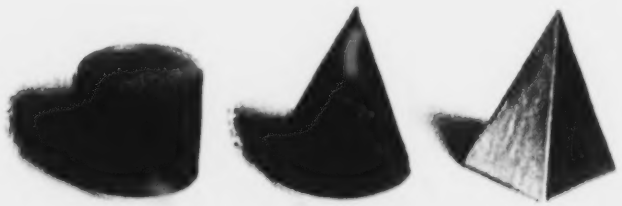


FIG. 1 The three objects used in the task

B. The performance

He first drew an oblong square with the top line slightly curved, then using a pen of different colour to attempt an oval on the top (Figure 2, a). The oval was not yet finished when he announced that it was a "failure". He was urged by the experimenter to try another one. Using the same pen, he then started from the oval outline. As he finished it, he hesitated for a long time before he changed pen to draw the rest. While he was hesitating, he made several feint strokes in the air above the oval outline he had drawn, as if to try out the shape and position of these lines. He then drew a oblong square with the top line slightly curved, a shape almost identical with what he drew in the first attempt (Figure 2, b). He again announced that it was "wrong". In his third attempt, he started with the oval shape on the top, then one perpendicular line each from both ends of the oval shape, and finally connecting the bottom ends of the two perpendicular lines. Here, instead of a right angle, he very carefully curved the joining part, while he muttered to himself "Yes. Yes. Here. It should be like this" (Figure 2, c). He pushed the paper toward the experimenter and said "Done!"

When shown the second object (Figure 1, b), he managed to draw the object with the bottom line slightly curved up (Figure 2, d). However, the third object, a pyramid (Figure 1, c) again caused hesitation. Announcing it wrong, he gave up the

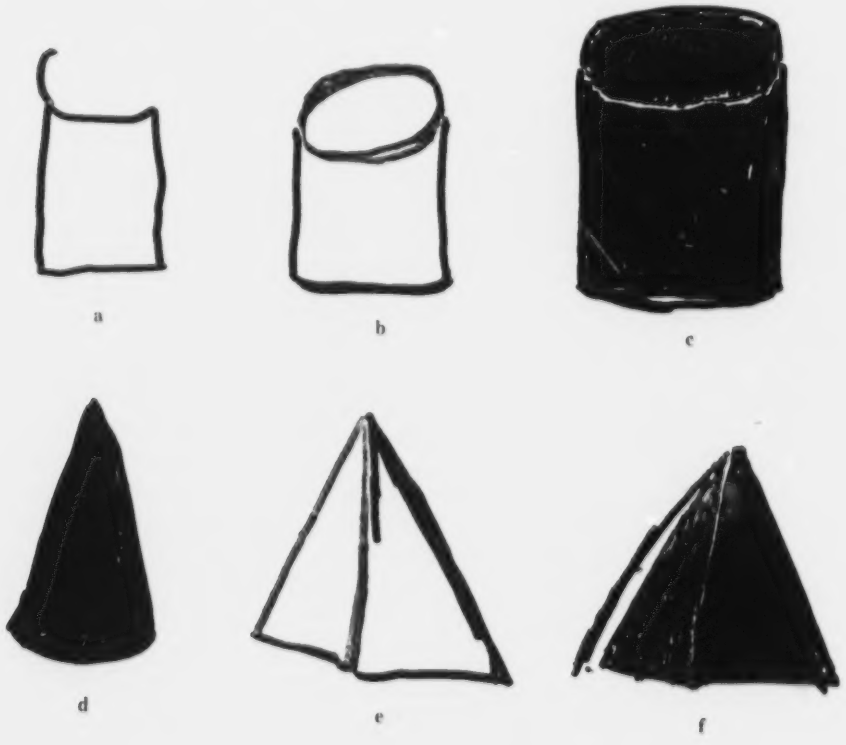


FIG. 2 Six drawings by an 8 year old boy

half drawn shape and turned the paper over (for there was no more paper under the one he was drawing), and drew two triangles, side by side (Figure 2, e). Not satisfied with this ("the line is too straight"), he attempted it again in the space left, only to find himself repeated what he just drew; two triangles side by side next to each other, with almost horizontal bottom lines (Figure 2, f). He was obviously very puzzled by, and dissatisfied with his last performance, for he kept commenting on what he thought was "the mistakes". He said, in a low voice, half addressing the experimenter, half to himself, that he wanted to put crosses on "those wrong lines". After denouncing his first attempt at drawing the pyramid, he turned the paper and found no more left, saying "No more". With no more paper left, and without being further encouraged by the experimenter to continue, he seemed to have sensed that he had to end the session. He gave up making further attempt to draw, and pushed the drawing toward the experimenter, without saying "Done!" He did not attempt to negotiate further, partly because the events and experience had so accumulated that, as a second grader, he felt it not proper to be too insistant.

C. Interpretation

Now, a comparison of the three drawings of the cylinder shows that the only difference is in the joining parts. It seems to be the case that after two trials, he eventually found an agreeable solution to the conflict between his perception of the object and his skills in representing. In other words, it was as if he could not persuade himself, before the third attempt, that the bottom part of the cylinder could be drawn similar to the curve line on the top as he had done. What is interesting is that when drawing the top part of the cylinder, he was able to use an oval shape or a curve line to represent what he saw, he did not succeed in representing the bottom part of the object; he drew a straight line to connect the two perpendicular lines to form a square bottom. This suggests that the child's "failure" might have other reasons than simple inability in using curve line for representing the top or the bottom parts of a cylinder. The answer to the puzzle lies in the nature of the conflict that seemed to bother the child during the drawing task.

D. The nature of the conflict

The observation described above was a part of a larger research project on the development of motor skills in drawing. The experiment was so designed that after the production task (i.e., children drawing the objects presented), a recognition task was also administered, to clarify the production vs. recognition issue. It was in the child's verbal response during the recognition task that a clue to the nature of the conflict was to be found. In the recognition task for the cylinder shaped object, he was presented with a set of 6 pictures which the experimenter had prepared (Figure 3). He had no difficulty in choosing the "correct" one (Figure 3, f) as representing what he saw. However, when asked to compare it with the first and the second drawings he did (and had subsequently denounced as "wrong"), he commented that the difference was in the straight line in his own drawings and the curve line in the "correct" picture he had chosen. When asked which better depicted the object "as seen", he answered

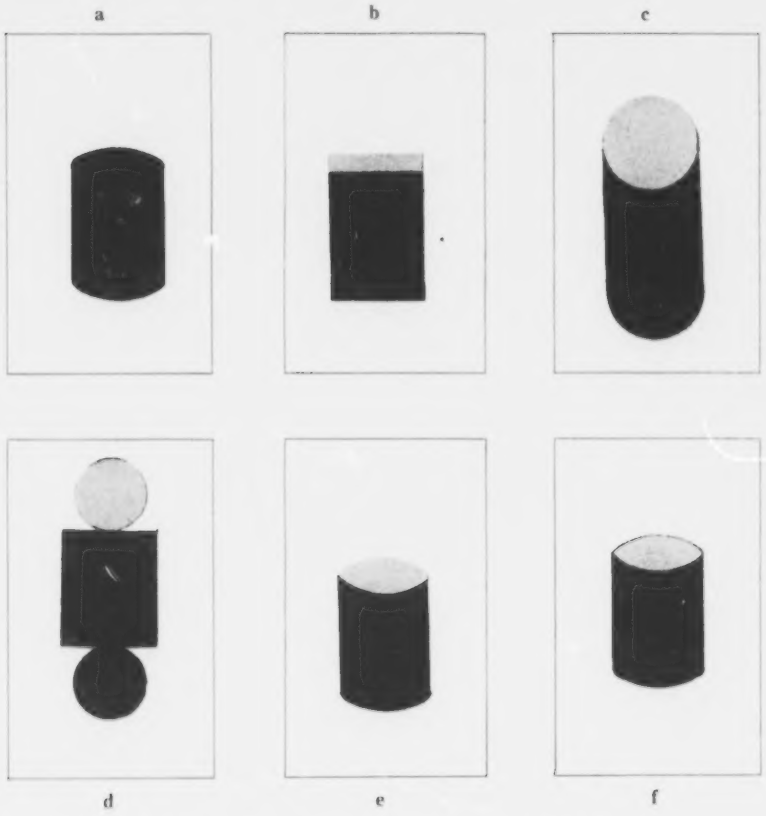


FIG. 3 The six cards used in recognition task for cylinder

"Mine is better, because yours looks unstable". He was referring to the curved bottom line in the picture. It is perhaps difficult for ordinary adult people to see the point in his comment, for we have learned the conventional graphic representation for round or cylinder shpe of object (i.e., by way of curve line), and we have been "persuaded", through our experience, to perceive the curve line at the bottom as also conveying the sense of stability of the object. To the adult people, the curve line at the bottom of the picture of a cone or cylinder no more suggests the possibilty of movement (i.e., instability) of the object. It is this kind of conflict that puzzled our subject during the task. Recall the observation mentioned earlier concerning the inability to draw owing to the size of the object. That phenomenon does not seem to be unrelated to what has just been discussed. To both observations suggest the possibility that children bring with them something additional in their perception of the object and of the drawing task.

If it is permissible to describe the picture drawing task as requiring the drawer to select a part of their experience with the target object and to represent (transform) it, while inhibiting other part, the phenomena described above can be considered as

suggesting the possibility that some children, under some conditions, fail to inhibit, or at least, find it difficult to do so. When the children refused to draw and gave size (either of the object to be drawn or of the paper) as the reason, the conflict seems to lie in the fact that somehow the children felt imperative to represent all the experience they had obtained from handling and seeing the object, including the tactile and visual experience of the size. They failed to draw because they did not (or could not) transform and inhibit the part of their experience which, when translated into actual execution, created the size problem.

This seems also to be the case with the 8 year old boy, for the straight lines he drew to represent the bottom of the cylinder and the pyramid were supposed to represent what he felt as a sense of stability of the objects on the flat table surface. In other words, the child's problem was caused by a conflict between representing what he felt as a sense of stability of the objects, and the perception of the curve line (which to him suggested more about the possibility of movement (i.e., instability) than the roundness of the objects). It is also interesting to note that he vacillated from a "successful" drawing of the cone, after two "failures" and one successful attempt in drawing the cylinder, to three consecutive "failures" for the pyramid. And again, during the recognition task, he first chose the "correct" one prepared by the experimenter, but when asked which better depicted what he saw, he opted for his own solution which he once denounced as incorrect. The vacillation suggests perceptual conflict and the instability of the understanding he was beginning to grasp.

IV. CONCLUBING REMARKS

Although there are several aspects of the events I described and interpreted above which need further confirmation, the phenomena are not uncommon. However, because when one is confronted with them, one of the common responses of the researcher is to modify the task or to replace the subject, these problems do not seem to have attracted enough attention so far. Furthermore, there are several problems which can be asked about these phenomena that can hardly be answered now. For example, Why these problems do not seem to occur in younger children? What is or are the individual factors which are responsible for these phenomena to appear? Indeed, how can one better account for these phenomena? The following are my speculations.

The experimenter's instruction (i.e., "Draw a picture of an object".) is a message whose meaning has to be interpreted and grasped in terms of actual behaviour of the subject. There is nothing in the words (e.g., to draw, to represent, etc.) that can guide the receiver of the message as to how actual action should be taken. In contrast with drawing "out of one's head" ("free drawing"), to draw an object involves quite different operations, some of which are not necessarily self-evident to younger children. Some operations or steps are so private that experience is necessary before correct judgement can be made that will lead to what eventually constitutes proper, or acceptable, understanding of the message. Indeed, even "free drawing" is not so easy. There are so many other similar things in life that need to be learned like this.

In the drawing task situation, a lot of things are assumed by both the researcher

and the subject. The verb "to draw" (i.e., when applied to drawing an object), does not sepcify the details in the manner of respresentation, nor does it stipulate the manner of treatment of the relationship between the drawer and the object (or whatever sensory experience derived). The drawer is free, so to speak, in deciding how the phenomenon is to be segmented and what to do with the result of one's segmentation. When a young child, or indeed anybody who first learns to draw, he/she learns a lot of tacit things, such as what can be effected, what has to be carried out in order to obtain such and such effect, which aspect(s) of one's experience can be treated in so and so manner, etc. It is only by a slow proces that one learns what is more or less expected, after discarding and adding many, on the way.

It seems that our subject in the above case was accidentally "caught" doing the critical learning. In theory, the conflict he showed is not peculiar to him, it could (or should) occur in anyone in the process of learning how to draw an object. One could have crossed the line without knowing it.

Note

Another recent observation was related to the author by one of his colleagues, Miss Yukari Shirotani. According to her, the size of objects used in the task had to be reduced, as a result, in order to ascertain more positive response from the subjects. In this case, 6 out of the 10 children between 5 and 6 years of age recruited for the pilot study were said to have refused the task for the same reason.

Acknowledgement

The author would like to thank those students who helped in carrying out the experiment described in the paper, and children who served as subjects. The students were participants in the 1989 Development Psychology Experiment class conducted by the author.

References

Ames, L. B. (1984). Postural and placement orientations in writing and block behavior: developmental trends from infancy to age ten. *Journal of Genetic Psychology*, **73**, 45-52.

Barrett, M. D., Beaumont, A. V., & Jennett, M. S. (1985). Some children do sometimes do what they have been told to do: task demands and verbal instructions in children's drawing. In N. H. Freeman & M. V. Cox (Eds.) Visual order: the nature and development of pictorial representation. New York: University of Cambridge Press.

Freeman, N. H. & Cox M. V. (Eds.) (1985). Visual order: the nature and development of pictorial representation. New York: Cambridge University Press.

Halverson, H. M. (1931). An experimental study of prehension in infants by means of systematic cinema records. *Genetic Psychology Monographs*, **10**.

Harris, D. B. (1963). Children's drawings as measures of intellectual maturity. New York: Harcourt, Brace & World.

Thomas, G. V. & Silk, A. M. J. (1990). An introduction to the psychology of children's drawings. Hemel Hempstead: Harvester Wheatsheaf.

Valsiner, J. (1987). Culture and the development of children's action. Chichester: John Wiley & Sons.

EVALUATION OF ONE'S TASK PERFORMANCE IN REFLECTIVE AND IMPULSIVE CHILDREN: ANALYSIS OF METACOGNITION

Hiroshi Usui
Hokkaido University of Education, Sapporo

We administered the Matching Familiar Figures Test (MFFT) as a criterion measure of cognitive reflection-impulsivity to 161 3rd graders and 167 6th graders. Immediately after this test, we interviewed all of the children individually about metacognitive knowledge and activities such as their interpretation of a task goal or requirement, ways of allocating their efforts to enable accurate and fast reaction, etc. There was a significant difference between reflectives and impulsives on self evaluation of errors in the MFFT and this result might be attributed to actual large differences between the two style groups. However, while reflectives took about 2.5 times the lengh of the time taken by impulsives before choosing the first answer, their subjective estimation of time taken was almost same as that of impulsives.

Although the majority of children categoraized as either of the cognitive styles were thinking that accuracy was more important than speed, reflectives were actually tending to allocate more effort resources toward accuracy, but in contrast to this, impulsives did not differentiate between the two types of effort resources. In addition, reflectives were apt to pause and take more time on items which were judged as more difficult than others, but impulsives did not seem to modulate their cognitive effort in tuning the level of difficulty.

Key words: reflection-impulsivity, conceptual tempo, cognitive style, metacognition, individual differences in decision making processes

INTRODUCTION

Cognitive reflection-impulsivity is concerned with the individual differences in evaluating one's solution hypotheses in cognitive problems which contain response uncertainty (Kagan, 1971). This concept is operationally defined through the Matching Familiar Figures Test (Kagan *et al.*, 1964) which involves matching familiar figures. In this test, the standard and six variants which are same as the standard except for

1) This study was supported by a research grant from the Japan Ministry of Education (No. 58710027) and was based on a paper presented at 27th annual convention of the Japanese Association of Educational Psychology in 1985.

2) Requests for reprint should be sent to Hiroshi Usui, Hokkaido University of Education-Sapporo, Sapporo, Japan, 002.

small details, are presented simultaneously. We measure the latency to first choice of any variants and the number of errors and classify into four cognitive style groups using the double median split procedure with two measures: reflectives, impulsives, fast/accurates, and slow/inaccurates. Roughly speaking, the two major cognitive styles share one-third each and the other two styles share one-sixth each, but as stability of the latter groups is very low with only less than one-third having contiuied to remain the same style during the one year from second to third and fifth to sixth grade in elementary school (Usui, 1982), we will focus on the former two styles: reflectives and impulsives.

Since fast reaction tends to lead to more errors with deliberately slower reaction tending to reduce errors, these two measures explicitly correlate negatively to each other. In other words, we can redefine this test situation as the mutually incompatible task goals of fast solution against accurate choice. So a trade-off must occur contradicting goals. That is to say, some aspects of metacognitive processes, such as the interpretation of the goals, evaluation of task difficulty, and distribution of effort etc, will determine the task performance of children. This would indicate the necessity for more in-depth research in this area, but up to now, with a few exceptions (e.g., Kurtz, 1984; Nakazawa, 1986), there have been relatively scant research findings concerning metacognitive processes.

Finally, immediately after the MFFT, we attempted to analyze the self-report pertaining to the metacognitive activities of the elementary school children, and clarify some of the variables which determine the reflective and impulsive cognitive styles by comparing the activities of the two groups.

METHOD

Subjects

One hundred and sixty-one third graders (87 boys and 74 girls) and 167 sixth graders (84 boys and 83 girls) took part in these experiments. The average age at administrating the MFFT was 9:2 for 3rd graders and 12:2 for 6th graders.

Procedure

We individually administered on all of the subjects the shorter version (15 items) of the MFF-20 (Figure 1) (Cairns and Cammock, 1978) and asked the following questions immediately after the test.

Content of questions was as follows:

1. number of items child found difficult (any number)
2. degree of effort devoted to the accuracy of choice (six-point scale, from 6 as the highest to 1 as the lowest)
3. degree of effort devoted to speed of choice of any of the variants (six-point scale, from 6 as the highest to 1 as the lowest)
4. evaluation of one's errors (six point scale, from 6 as the highest to 1 as the lowest)
5. evaluation of one's latency to the first response (six-point scale, from 6 as the

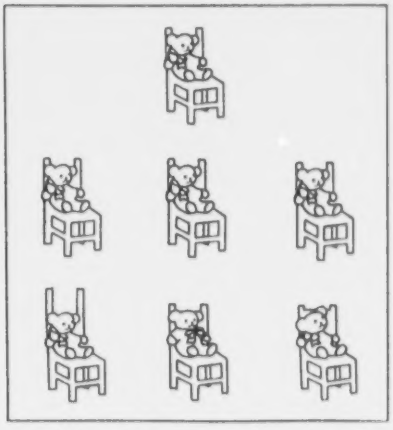


FIG. 1 An item excerpt from MFFT

highest to 1 as the lowest)

6. belief about the value of accuracy in responses (six-point scale, from 6 as the highest to 1 as the lowest)

7. belief about the value of speed in responses (seven-point scale, from 7 as absolutely agreeing to 1 as absolutely disagreeing)

8. belief about the effectiveness of longer latency for decreasing errors (seven-point scale, from 7 as absolutely agreeing to 1 as absolutely disagreeing)

9. the general difficulty of the items (seven-point scale, from 7 as extremely difficult to 1 as extremely easy)

We asked these questions with the aid of cards on which were written the pertinent questions and answer options (six to seven options).
It took about half an hour to complete whole procedure (MFFT and the interview).

RESULTS AND DISCUSSION

Classification of children

We classified the reflective and impulsive children using double median split criterion children of total errors and latency in the MFFT. In other words, the child who scored above the group median for one's grade in latency to first response and were below the median in terms of errors were classified as reflective. The opposite criteria were used to classify children as impulsive. This resulted in 64 (36 boys and 28 girls) reflectives and 62 impulsives (36 boys and 26 girls) among the third graders, and 62 (30 boys and 32 girls) reflectives and 67 (36 boys and 31 girls) impulsives among the sixth graders.

The correlation between latency and errors for both grades was satisfactorily high as $-.64$ ($p<.001$) and $-.62$ ($p<.001$) at third and sixth grade respectively.

Comparisons of reaction to metacognitive questions

Reflectives in both grades were significantly underestimated their errors ($p<.01$, $p<.01$ for 3 rd and 6 th graders respectively) and expected greater effort to make accu-

rate choice than both grades of their impulsive counterparts, although the differences were almost significant for 6 th graders ($p<.05$ and $p<.10$ for 3 rd and 6 th graders). Since there was an extremely great difference in the number of errors between the two cognitive style groups (6.89 vs. 19.84 and 4.10 vs. 14.21 for reflectives and impulsives at 3 rd and 6 th grade), these differences were naturally expected.

But, their evaluation of latency did not seem to be congruent with any salient differences between the cognitie styles (289.70 sec. vs. 103.78 sec.; 258.00 sec. vs. 104.70 sec. for reflective and impulsive children at 3 rd and 6 th grade respectively). That is, reflectives in both grades evaluated their reaction time just the same as impulsives did. This finding implies that there existed a different frame of time estimation system or internal clock among the two styles (Walker, 1982; Usui, 1985).

Comparisons of metacognitive knowledge and its execution (distribution of cognitive effort)

How did reflectives and impulsives interpret the task requirements of MFFT? Also what did they think about the strategies which seemed to be more successful in solving the tasks? We tried to analyze the nature of metacognitive knowledge and actual distribution of their efforts.

(1) Accuracy vs. speed: In order to determine the relative emphasis on accuracy and speed within a subject, we compared the score of the degree of importance of accuracy and speed of each subject (Table 1), and sorted them into two groups (accuracy emphasizer and speed emphasizer). If their score for accuracy was higher than

TABLE 1

Mean scores of metacognisive interviews

	3 rd (Ref=64, Imp=62)		6 th (Ref=63, Imp=67)	
	reflectives	impulsives	reflectives	impulsives
number of difficult items	3.79 (1.76)	4.82* (2.67)	4.04 (2.52)	4.63 (2.41)
amount of effort to accuracy	4.44 (1.13)	3.94* (1.16)	4.80 (0.91)	4.43† (1.05)
amount of effort to fast response	4.06 (1.36)	3.98 (1.45)	4.20 (1.15)	4.50 (1.22)
importance of accuracy	6.03 (0.93)	5.95 (0.93)	5.61 (1.06)	6.09* (0.93)
importance of fast response	5.08 (1.36)	5.26 (1.29)	4.91 (1.26)	5.02 (1.51)
self evaluation of errors	3.81 (1.04)	4.35** (1.19)	3.65 (1.39)	4.74** (0.84)
self evaluation on latencies	4.17 (0.95)	4.05 (1.03)	4.35 (0.82)	4.30 (0.99)
effectiveness of slower latency	4.95 (1.25)	4.94 (1.37)	5.24 (1.16)	5.28 (1.51)
global ratings of difficultness	4.88 (0.93)	4.79 (1.37)	5.20 (0.91)	5.00 (1.26)

†: $P<.10$, *: $P<.05$, **: $P<.01$

figures in parentheses indicate standard deviations

TABLE 2
Classification of accuracy emphasizers and speed emphasizers

	Reflectives		Impulsives		Total	
	3 rd grade	6 th grade	3 rd grade	6 th grade	3 rd grade	6 th grade
Speed Emphasizers	14 (22.6%)	5 (11.4%)	17 (30.4%)	6 (11.8%)	31 (26.3%)	11 (11.6%)
Accuracy Emphasizers	48 (77.4%)	39 (88.6%)	39 (69.6%)	45 (88.2%)	87 (73.7%)	84 (88.4%)

that of speed, they were were classified as an "accuracy emphasizer" and if the former was lower than the latter, then they were classified as a "speed emphasizer". As shown in Table 2, the percentage of accuracy emphasizers significantly increased from 3 rd (73.7%) to 6 th graders (88.4%) ($\chi^2=7.18$, df=1, $p<.001$). Furthermore, there were consistently more accuracy emphasizers regardless of the difference in cognitive styles.

This result suggested that children gradually became more concerned with accuracy during middle childhood, with reflectives as well as impulsives preferring accuracy to speed, though there were great differences in latencies and errors between both styles.

(2) Effectiveness of delaying latency on decreasing the number of errors: Both reflective and impulsive children of both grades admitted the effectiveness of slower latency to decrease errors. Their mean rating scores were around 5 points which mean "agree" on the seven point scale (from 7: absolutely agree to 1: absolutely disagree).

While reflectives as well as impulsives thought that the strategy of taking more time would lead to more accurate answers, why was it that impulsives actually did not use this strategy? Or maybe impulsives felt that their decision time was long enough to be effective to reduce errors. Or possibly, they did know of the strategy and felt that they had used it, but that they did not activate it and did not moderate their less preferred strategy (Neimark, 1985). That is, it is suggested that this difference seemed to have stemmed from the execution process of metacognitive knowledge rather than the knowledge itself.

(3) Actual distribution of effort: Although reflectives felt that they devoted more effort to accurate choice than impulsives regardless of grades, the effort devoted to fast choice did not differ between styles. Then we compared scores of the two kinds of effort for each subject and if the scores of accuracy were higher than that of speed, we classified them as "accuracy seekers". And if the scores were the reverse, we classified them as "fast choice seekers". As shown in Table 3, the number of accuracy seekers tended to increase developmentally (57.0% vs. 71.2% for 3 rd and 6 th graders respectively). Also, we found there were relatively large differences between styles. For example, the accuracy seekers accounted for 63.7% and 77.8% of reflectives in contrast with 50.9% and 47.2% for impulsives (3 rd and 6 th graders respectively). While impulsives evaluated the importance of accuracy significantly higher than reflectives at 6 th grade (Table 1), they felt that a smaller amount of effort resource had been devoted to accuracy than 3 rd and 6 th grade reflectives.

TABLE 3

Classification of fast choice seekers and accuracy seekers

	Reflectives		Impulsives		Total	
	3 rd grade	6 th grade	3 rd grade	6 th grade	3 rd grade	6 th grade
Fast choice Seekers	22 (37.3%)	10 (22.2%)	27 (49.1%)	28 (52.8%)	49 (43.0%)	38 (38.8%)
Accuracy Seekers	37 (63.7%)	35 (77.8%)	28 (50.5%)	25 (47.2%)	65 (57.0%)	60 (71.2%)

Mean latencies and errors for difficult and easy items

Regarding the number of items judged as difficult, impulsives counted significantly more items in number than reflectives at 3 rd grade, but there was no

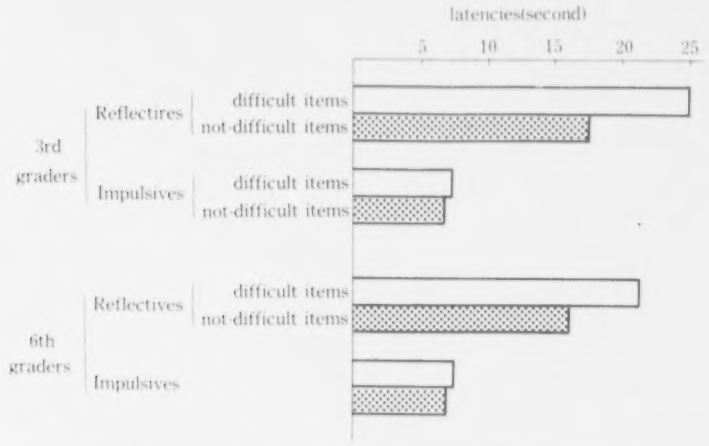


FIG. 2 Mean latencies of difficult and not-difficult items

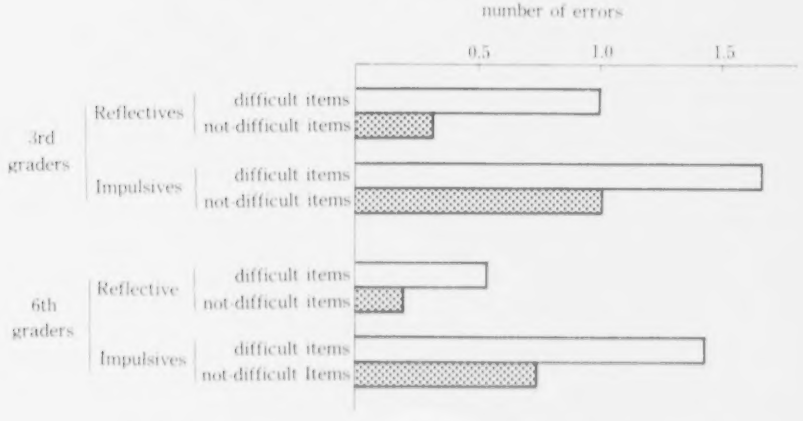


FIG. 3 Mean number of errors of difficult and not-difficult items

difference at 6 th grade (Table 1). However, when we come to compare latencies for difficult vs. not difficult items, we can find clear differences between styles (Figure 2). While reflectives tended to modulate their latency to their estimation of difficulty, impulsives responded to each item in the same fashion. Both reflectives and impulsives judged an item as difficult if they had made more errors on it, although there were great differences in errors between the groups (Figure 3). So having experienced failures determined the rough judgment of difficulty for both styles similarly.

In summing up, judgment of the degree of difficulty by impulsives seemed to largely depend on the resultant errors, and to some extent, this was the same for reflectives, but in additon to this, the latter style might use the length of time needed to detect one plausible answer as another clue in judging their subjective level of difficulty. And/or they actively moderate decision time and mobilized their resources if they were faced with tricky figures in the MFFT. Or, they might utilize their strategy more effectively than impulsives.

REFERENCES

Cairns, E. & Cammock, T. (1978). Development of a rore reliable version of the Matching Familiar Figures Test. *Developmental Psychology*, **14**, 555-560.

Kagan, J., Rosman, B. L., Day, D., Albert, J. & Philips, W. (1964). Information processing in the child: Significance of analytic and reflective attitudes. *Psychological Monographs*, **78** (1, Whole No. 578).

Kagan, J. (1971). The role of evaluation in problem solving. In J. Hellmuth (Ed.), Cognitive studies 2: Deficits in cognition. Brunner/Mazel, pp. 109-126.

Kurtz, B. E. (1984). Metacognition and reading comprehension in impulsive and reflective children: A longitudinal investigation. University Microfilms International.

Nakazawa, J. (1986). Reflective and impulsive cognitive styles and metacognitive behaviors. Paper presented at the 28 th annual convention of the Japanese Association of Educational Psychology, in Japanese.

Neimark, E. D. (1985). Moderators of competence: Challenges to the universality of Piagetian theory. In E. D. Neimark, R. De Lisi, & J. L. Newman (Eds.), Moderators of competence. Lawrence Erlbaum Associates.

Usui, H. (1982). Longitudinal analysis of the cognitive reflection impulsivity. Paper presented at the 24 th annual convention of the Japanese Association of Educational Psychology, in Japanese.

Usui, H. (1985). The effect of exposure time on match to sample task: Relevance to cognitive reflection impulsivity. Journal of Hokkaido University of Education, *Section IC (education)*, **37**, 1, 47-56. (in Japanese)

Walker, N. W. (1982). Comparison of cognitive tempo and time estimation by young boys. *Perceptual and Motor Skills*, **54**, 715-722.

ANALYZING EYE-FIXATIONS TO ASSESS INDIVIDUAL DIFFERENCES IN SOLUTION STRATEGIES FOR SPATIAL TASKS

Kimiharu Satoh
Hokkaido University

The purpose of this study is to clarify the individual differences in solution strategies for spatial tasks in an intelligence test. Twenty-nine undergraduates carried out paper-folding tasks, of the type sometimes used in measuring the spatial ability of intelligence. Each subject's sequence of eye fixations was recorded during the task solution. The differences in solution strategies between high-spatial ability subjects and low-spatial abilities were demonstrated through an analysis of the eye fixation data. The high ability subjects were those who either constructed the spatial representations quickly with no backtracking through the stimulus items or used many searching eye movements back and forth between the stimuli and response alternatives. Low-ability subjects showed more eye tracking through the stimulus items and required more time to construct the spatial representations.

Key words: intelligence, spatial ability, scanning strategy

INTRODUCTION

Differential or psychometric approaches to understand the nature of intelligence dominated theory and research in the first half of this century. Investigators using such approaches have shared the desire to understand intelligence in terms of a set of underlying abilities, such as, for example, verbal ability and reasoning ability. These underlying abilities are identified by means of a mathematical technique called factor analysis. Indeed, we have become increasingly able to specify the knowledge used in response to various kinds of test items. Psychometric approaches have laid greater stress on the results of intelligence performance tests than on the processes used in responding to the test items. Psychometricians have been criticized for their inattention to the processes that give rise to the results measured by the tests (Sternberg, 1982).

During the 1970s, a lage number of investigators took an information processing or cognitive approach towards understanding intelligence. This approach is termed to be the "New look in Intelligence Research" (Resnick, 1981; Keating, 1984). The goal of this research is to discover the representations, processes, and strategies subjects use in solving problems widely acknowledged to require intelligence for their solution.

Sternberg (1981) has classified these cognitive approaches into four different cat-

egories, i.e. cognitive components, cognitive correlates, cognitive training, and cognitive contents approaches. Here, I will pay attention to the componential and correlational approaches.

The cognitive components approach is typified by the work of Robert J. Sternberg. The cognitive components approach is task analytic and attempts to directly identify the information processing components of performance of tasks generally used to assess mental ability. The fundamental unit of analysis is the component, which is an elementary information process that operates upon internal representations of objects or symbols. A componential theory consists of two parts: identification of the components involved in task performance, and specification of the combination rule for these components (Sternberg, 1977).

In componential analysis, individual differences may derive from five sources: (1) components, (2) combination rules for components, (3) order of components processing, (4) mode of components processing, (5) component time or power (Sternberg, 1977). Individual differences may occur in components. Some subjects may solve problems using components a, b, c, and others using components c, d, e. In terms of component time or power, some subjects may perform certain operations more quickly or more easily than do other subjects. Sternberg has succeeded in developing his unique theory and describing the individual differences using analogical reasoning tasks.

However, some questions have been posed regarding the componential approach. For example, that this approach could not sufficiently explain the existence of individual differences in performance on intelligence testings which are used in real life because it focuses mainly on analyzing and theorizing about the structure of cognitive components as task variables.

The cognitive correlates approach seeks to specify the information processing abilities that are differentially related to high and low levels of aptitude. Tests of intelligence are used to identify subgroups which are then compared in laboratory tasks involving cognitive processing characteristics defined by prior experimental investigation (Pellegrino & Glaser, 1979). The work of Hunt and his colleagues (Hunt, Lunneborg & Lewis, 1975; Hunt, 1976; Hunt & MacLeod, 1979; Hunt, 1985) provides a good example of this approach. They raised a series of questions about the differences between high and low verbal or spatial ability groups that relate to structures, processes, and parameters of the information processing system. The intent of this approach is to ascertain the basic information-processing differences that distinguish high from low-ability persons. The results obtained by Hunt and his colleagues strongly suggest the presence of basic information processing differences between high and low verbal ability groups. That is, a series of their experiments has suggested that undergraduates who score highly in a verbal ability college entrance examinations show faster performance in tasks that require information to be accessed in the long-term memory and manipulated in the short-term memory. In general, they conclude that verbal intelligence tests gauge a person's knowledge of language, such as the meaning of words, syntactic rules, and so on, and that these tests also indirectly assess to the information processing capacities fundamental to experimental studies of memory.

The central problem of this study is to specify the differences in the processes

and selection of solution strategies which have been used by good and poor spatial thinkers faced with a spatial task. The eye tracking data has been analyzed in order to describe the solution strategies. The final goal of this study is to explain the causal mechanisms of occuring individual differences of the spatial ability, that is, what makes some individuals better than others at solving spatial problems.

Some cognitive psychologists are interested in eye-movement tracking which is a useful device for analyzing cognitive processes. Just and Carpenter (1976, 1985, 1986) have applied this eye tracking approach to the study of test-like cognitive tasks, including mental rotation, sentence-picture comparison, and quantitative comparison. Their data suggests that eye fixation sequences can be linked to cognitive processing models. Snow (1980) has also used the eye fixation data to identify solution processes used in spatial and verbal subtasks of intelligence tests.

METHODS

Subjects

Total IQ score and SS scores of 12 subtests of the Kyodai (Kyoto University) NX-15 intelligence test were obtained for 39 undergraduates. From these, 29 (14 females; 15 males) were chosen because of their high or low composite scores of visualization and spatial ability subtests of NX-15.

Four items plus a practice paper-folding task were carried out by these 29 final subjects under conditions allowing VTR recording of each subject's sequence of eye fixations during item solution.

Materials

(1) Paper-folding task.

The task chosen for this study was a modified version of the Paper Folding test (French, Ekstrom, & Price), in which subjects are asked to imagine that a square piece of paper is folded one or more times, punched once through the folded layers, then unfolded. In each item, a sequence of figures depicts the folding and punching process. The subject then chooses one of the five multiple-choise response figures that show a selection of locations of the holes in the unfolded paper. The paper folding task was also used to identifying the individual differences of spatial representations as cognitive aptitudes in Snow et al's Aptitude Process Studies. Using 17 undergraduate subjects, a pilot study determined two moderately difficult items of each F-2 & F-3

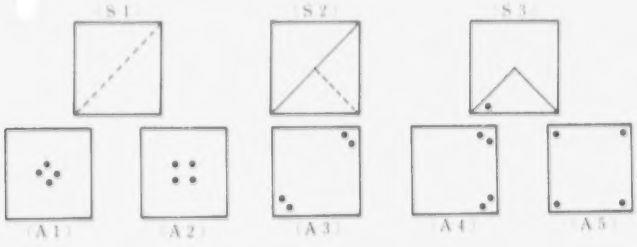


FIGURE 1 An Example of the paper-folding task (F-2 Task)

Task and one practice item. F-2 (2 folds) and F-3 (3 folds) Tasks differed in terms of the number of folds per item, i.e., the former being easy and the latter difficult. Figure 1 shows an example of F-2 Task. All items were presented on an opaque screen using a single frame projector.

(2) Recording of eye-movements

An Eye Mark Recorder (NAC) was used to record eye movement during item performance. This eye-movement recorder is head mounted and designed to record an observer's visual fixation and eye scans by imposing a fixation mark on the recorded visual field. Data was obtained with using a recording device and stored on VTR tapes.

Procedure

Subjects were given a paper-folding demonstration and one practice item. They were then fitted with an eye movement recorder and performed 4 items of F-2 and F-3 Tasks. Subjects were asked to press the response key and report the position number of the response alternative verbally as soon as they detected the correct alternative. Reaction time and correctness of response were recorded on VTR tapes in which eye movement data was recorded in a synchronized fashion. Subjects performed items and were handled individually.

Data Analysis of Eye-Movements

The eye fixation data was analyzed semi automatically by a computer-assisted eye-movement data processing system (Figure 2). In this system, the eye tracking

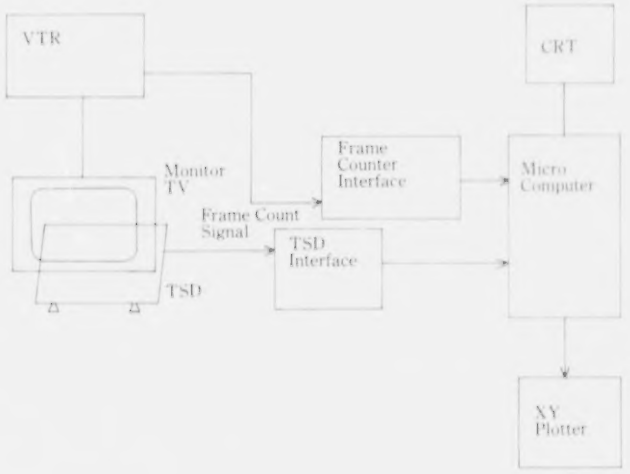


FIGURE 2 A Schematic diagram of eye-movement data processing

data was entered into a micro computer through a TSD (Touch Screen Digitizer), which was mounted on the display of the monitor TV. The duration time of each eye fixation and the distance between two fixation points were computed automatically, with the scan paths being traced by an X-Y plotter.

RESULTS and DISCUSSION

Overall Performance

The first stage of analysis examined correctness and reaction time for the paper-folding task. Table 1 shows the mean initial RT and the mean number of correct responses of high and low-spatial-ability subjects on both F-2 and F-3 Tasks. High ability subjects showed shorter reaction time than did low ability subjects, with the difference being especially pronounced in the F-3 Task. However, in general the reaction time data seemed to reflect more complex kinds of underlying individual

TABLE 1

RT and correct response of high- and low-subjects on paper-folding task

	composite score of spatial ability (NX-15)	Paper-Folding (F-2)		Paper-Folding (F-3)	
		initial RT	correct	initial RT	correct
High-ability sub. (n=14)	60.54 (6.04)	12.04 (4.29)	1.86 (0.36)	24.93 (11.33)	1.43 (0.76)
Low-ability sub. (n=15)	46.45 (4.50)	15.41 (7.12)	1.73 (0.45)	31.58 (16.56)	1.0 (0.75)

differences in information processing than can be ascertained by simple generalizations associated with reference abilities.

The mean number of correct responses in the F-2 and F-3 Task were moderately correlated with the composite spatial ability score of NX-15 ($r=.44$, $P>.02$). A major direction of the cognitive correlates approach for intelligence was sought to identify the basic cognitive processes that distinguish between high and low scores on a particular intelligence test. It has been justly expected that there should be a strong relationship between performance in laboratory information-processing tasks and scores on global measures of aptitude, such as IQ tests. However it has been frequently pointed out that a positive correlation could not be obtained between them. The theoretical argument is supported by data from studies that have indicated a positive relationship between the laboratory tasks and intelligence measures. The results of the significant correlation from this study permits us to examine and discuss the following results.

Solution Strategies and Eye-Movement Analysis

(1) Patterns of processing

With Paper Folding, the subject's task is to examine the upper row of pictures, understand the series of folds made in the piece of paper, and note where the hole is punched in the folded paper in the final frame. He must then decide what the paper would look like when unfolded, and find it among the five response alternatives in the lower row. It was hypothesized that there were three different stages or steps of

processing before the subject reacted to the response. These steps were tentatively labeled "constructing spatial representation," "selecting response alternatives or reacting," and "reconstructing spatial representation." The third step did not occure other than when the subject detected the inaccuracy of their own spatial representation. Figure 3 shows a flowchart model of a solution process in the paper-folding task. Some subjects appeared to repeat these steps several times, often in a rather disorderly fashion. Others seemed to spend almost all their time constructing, some shifting between stimulus and response parts of the item, and some not.

It is expected that the following patterns of processing exist. The high spatial ability subjects seem to perform a systematic and efficient analysis of the folding and unfolding steps in the stimulus row. Only after this systematic analysis of the stimulus does he look at the response row. He systematically scans across the response alterna-

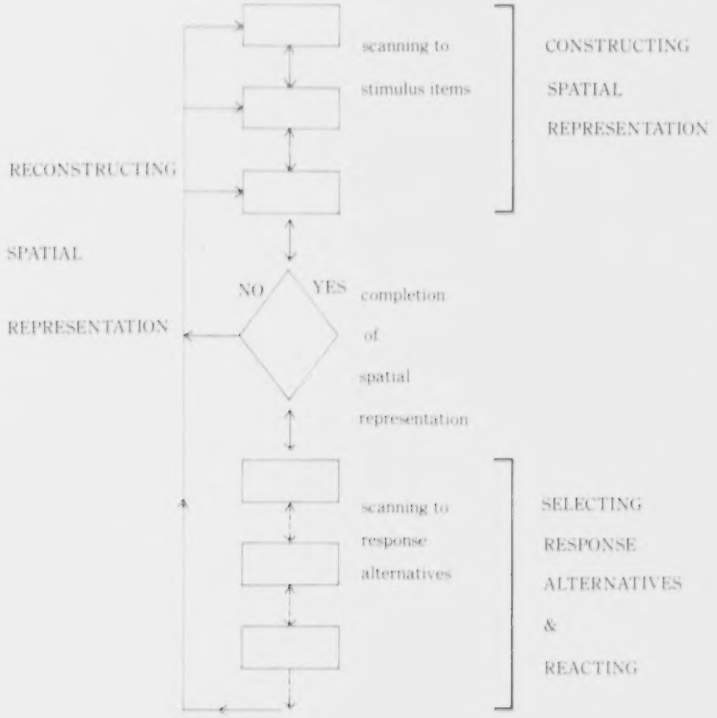


FIGURE 3 A flowchart of solution process in paper-folding task

tives. He then completes his scan, checks back to be sure, and finishes. The pattern for the low ability subject on the same item is unsystematic and inefficient. In particular, he spends more of his time comparing the stimulus row and constructing the representation, because of his poor ability to visualize the folding-unfolding process and to construct the representation of the unfolded paper.

(2) Eye-movement analysis

The upper part of Figure 4-(a) and -(b) shows the gaze time of both high and low ability subjects on each stimulus item and response alternatives in the F-2 Task. The low spatial ability subject spends more of his time looking at the third stimulus item in both steps of the constructing and the reconstructing representation. This would indicate that he needs more time to construct his spatial representation.

The mean number of fixations on each stimulus item and response alternatives, and some results of the sequential patterns of fixation are illustrated on the lower part of Figure 4. When analyzing the sequential patterns of fixation, the following two main scanning strategies were observed. They were respectively named "Backtracking" and "Checking". "Backtracking" refers to the backtracking of the scan between stimulus items. A comparing and switchbacking type of eye tracking between stimulus items and response alternatives is defined as "Checking".

The number of fixations on the stimulus items during the constructing period is greater for the low spatial ability subject than for the high. Especially the number of "Backtracking" in this first step is significantly greater for the low-ability subject.

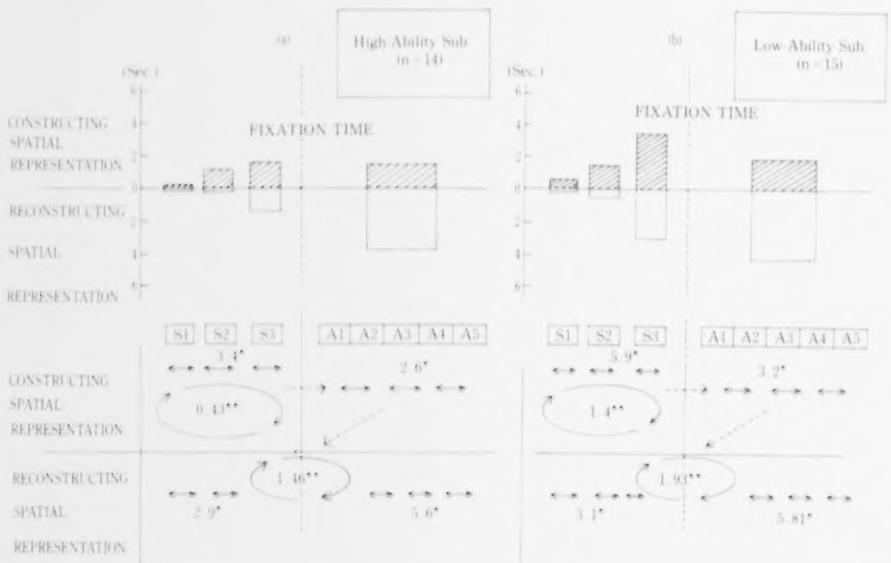


FIGURE 4 Fixation time and sequential patterns of fixation
*: number of fixation points
**: backtracking scan between stimulus item
***: comparing and switchbacking type of eye tracking between stimulus items and response alternatives

This would correspond with the results of the gaze time.

(3) Four different types of problem-solving strategies

By analyzing the sequential pattern of fixation, four different types of subject can be identified. The "High-speed Scanning (HS)" subject performs a rapid and systematic analysis of the stimulus items. He also systematically and rapidly scans across the response alternatives after the analysis of the stimulus. He then completes his scan, checks back to be sure, and finishes (see, Figure 5-a and 6-a). In contrast with the HS subject, the "Low-speed Scanning (LS)" subject scans unsystematically and inefficiently. He continually jumps from stimulus row to response row without any clear purpose (Figure 6-b). A sample eye-movement track of LS subject is illustrated on Figure 5-b.

"Systematic Comparison between Stimulus Items (CS)" is used by several low-ability subjects. They show systematic and sustained stimulus comparison processes, backtracking many times and devoting most of their time to this step (Figure 5-c, 6

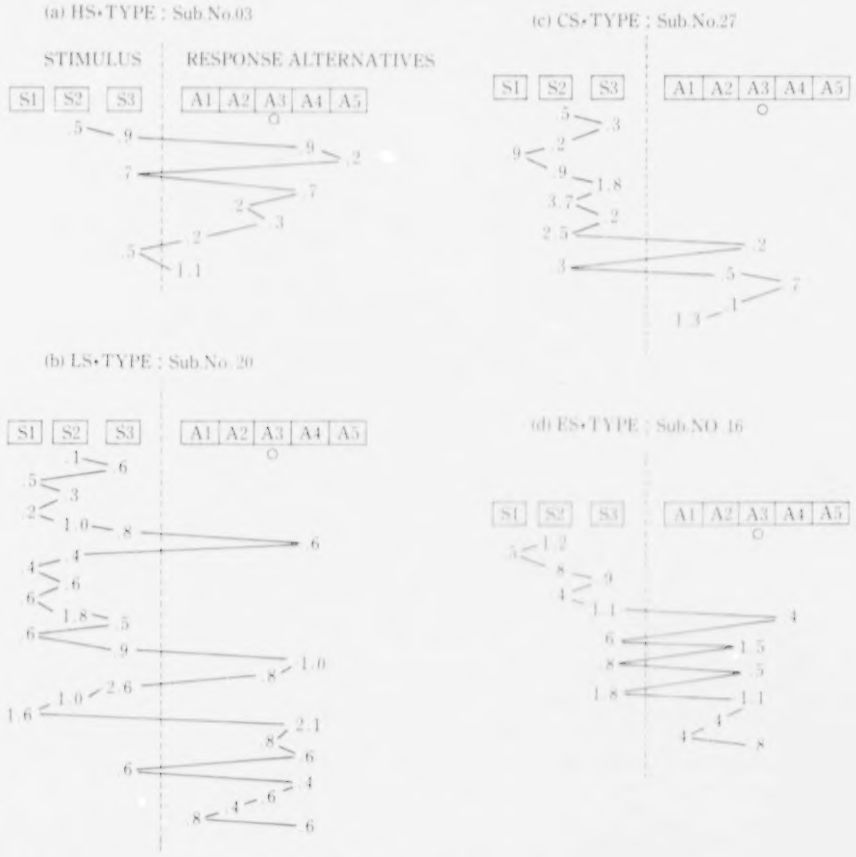


FIGURE 5 Eye-movement tracks for four subjects.
Time runs from top down in each track. Numbers indicate pauses in seconds.

FIGURE 6 Fixation time and sequential patterns of fixation for four types

-c). Processing strategy which depends heavily on scanning the stimulus row is due to the poor ability to visualize the folding-unfolding process and to construct the representation of the unfolded paper. Comparing with LS, however, the number instances of "Checking," scanning between stimulus items and response alternatives, is less for CS (see, Figure 6-c).

The subject in Figure 5-d uses what we termed "Response Elimination Strategy (ES)", in which he attempts to select the correct alternatives by an elimination process of comparing specific stimulus and response features of cues. He scans the stimulus folds rapidly, and shows many searching eye-movements back and forth between stimuli and response.

Figure 6 provides the results of the duration data of gazing and the sequential

TABLE 2
Types of solution strategy in high- and low-ability group

	Type of solution strategy
High-ability sub. (n=14)	HS: 6, ES: 6 LS: 0, CS: 2
Low-ability sub. (n=15)	HS: 3, ES: 1 LS: 6, CS: 5

Number indicate the number of subjects who use the each strategy.

patterns of fixation corresponding to each type of problem solving strategy.

Table 2 shows the subject number of four types of solving strategy per each high and low spatial ability subject group. There was a tendency for subjects who use HS and ES strategies to belong to the high-ability group. On the other hand there were many subjects using LS and CS in the low-ability group.

CONCLUSION

The purpose of this study was to identify the solution strategies which used by high and the low spatial ability subjects in the spatial tasks. In this study a paper-folding task was used as the spatial task, and some eye-tracking measures were considered to ascertain the differences in scanning strategies between good and poor spatial thinkers.

It seems possible to distinguish some classes of variables important in analyzing individual differences in solution processes. These classes are as followings: parameter variables, reflecting differences within a particular processing step (e.g., time spent on each target), looking sequence variables, reflecting differences in the order in which processing steps are taken (e.g., stimulus scanning systematically before looking at response alternatives versus searching back and forth between stimuli and response alternatives rapidly), and so on.

By analyzing the sequential patterns of eye-tracking, four basic patterns of processing were identified. Some subjects performed a rapid and systematic analysis of the stimulus items before searching the response alternatives. It was concluded that the high-speed scanning of high-ability subjects were attributable to their greater constructing ability of the spatial representation.

The response elimination strategy was used by some high-ability subjects. It seemed that such eye-tracking patterns were used either when an item proved difficult to solve by constructive matching, or when the subjects selected this somewhat risky strategy by themselves as their prefered strategy for solving such a task. This strategy also contributed to a rapid response the attendant possibility of mistakes. The two different strategies were used by high-ability subjects.

Analysis of eye-movements revealed that low-ability subjects in particular took longer to perform a construction of the unfolded paper. Because of this they were unable to visualize the folding process and ultimately guessed, some subjects used the response elimination strategy which appeared to be one of several fallback approaches used when an item proves too difficult to solve by constructive matching at the same

time.

The typical eye-tracking pattern of this solution processing was that of "Low speed Scanning (LS)" which was observed only in low-ability subjects.

REFERENCES

Carpenter, P. A., & Just, M. D. (1986). Spatial ability: An information processing approach to psychometrics. *In R. J. Sternberg (ed.) Advances in the Psychology of Human Intelligence*, Vol. 3 Erlbaum.

Hunt, E. (1976). Varieties of cognitive power. In L. B. Resnick (ed.) *The nature of intelligence*. LEA.

Hunt, E. (1985). The correlates of intelligence. *In D. K. Detterman (ed.) Current topics in human intelligence*. Vol. 1 (Research methodology) Academic Press.

Hunt, E., Lunneborg, C., & Lewis, J. (1975). What does it mean to be high verbal? *Cognitive Psychology*, 7, 194-227.

Hunt, E. & MacLeod, C. M. (1979). The sentence verification paradigm: A case study of two conflicting approaches to individual differences. In R. J. Sternberg & D. K. Detterman (eds.) Human intelligence: *Perspectives on its theory and measurement*. Academic Press.

Just, M. D., & Carpenter, P. A. (1976). Eye fixations and cognitive processes. *Cognitive Psychology*, 4, 277-299.

Just, M. D., & Carpenter, P. A. (1985). Cognitive coordinate systems: Accounts of mental rotation and individual differences in spatial ability. *Psychological Review*, 92, 137-172.

Keating, D. P. (1984). The emperor's new clothes: The "new look" in intelligence research. *In R. J. Sternberg (ed.) Advances in the Psychology of Human Intelligence*, Vol. 2 Erlbaum.

Pellegrino, J. W. & Glaser, R. (1979). Cognitive correlates and components in the analysis of individual differences. In R. J. Sternberg & D. K. Detterman (eds.) Human intelligence: *Perspectives on its theory and measurement*. Academic Press.

Resnick, L. B. (1981). Instructional psychology. *Annual Review of Psychology*, 32, 659-704.

Snow, R. E. (1980). Aptitude Processes. *In R. E. Snow, P. Federico & W. E. Montague (eds.) Aptitude, Learning, and Instruction*, Vol. 1. LEA.

Sternberg, R. J. (1977). Intelligence, information processing, and analogical reasoning: The componential analysis of human abilities. LEA.

Sternberg, R. J. (1982). Introduction. *In R. J. Sternberg (ed.) Advances in the Psychology of Human Intelligence*, Vol. 1 Erlbaum.

PERSPECTIVE TAKING IN CHILDREN'S DRAWINGS OF BALLS

Yukari Shirotani
Hokkaido University

INTRODUCTION

A variety of studies discussed mentality-reality distinction, because their interest has been in supposing that children must distinguish between children's internal thoughts and the events of the external physical world in order to free children from egocentrism.

Flavell and his co-workers (Flavell, 1974; 1978; Masangkay et al., 1974) suppose that there are at least two developmental levels of knowledge concerning visual perception. At Level 1, children can only distinct whether someone does or does not see the same object as they do. At Level 2, children further infer their interpretations of the object could not be the same as others' if their viewing circumstances differ. According to this proposition, children first getting to understand others may not always see the same objects as the chiliren currently see. Then they get to understand others have different visual perspectives of the same object (Flavell, 1974). However, most researches on visual perspective taking, investigate their response linguistically.

Recent researches on drawings illustrate that children's errors come not only from their graphic skill (Freeman & Janikoun, 1972; Phiipps et al., 1978). To research children's drawings should be effective if they reflect children's perspectives.

The present experiment was designed to investigate, using drawing tasks that don't require much graphic skill from the children. This experiment would also show that children get to understand what others see may be different from them, and how they interprete what others see, developmentally.

METHOD

Subject

Children from a public nursery school and a private kindergarten were used. Thirty-three children aged 3, thirty-eight chiliren aged 4, and fourty-three children aged 5 participated. Approximately one-half of the children of each age group were female.

Stimuli

A ball 7cm in diameter was used. Two colors divided the ball into halves. One color was red. The other was blue. The child drew 3 pictures of the ball on papers put on the desk in front of him/her. Twelve-color-crayons and three papers were used

for drawings of each child.

Procedure

Children were taken individually to a room in the school or the kindergarten. After establishing rapport, the experimenter showed the ball. Each child was first asked what colors were on the ball and which crayons corresponded to the colors on the ball. After confirming that the child knew that the ball had two colors on it, the experimenter showed the ball so that only the half of the ball painted in red could be seen by the child. Each child was then asked to draw the ball three times after following instructions; 1) how it is seen by the child (seeing-drawing); 2) how it is seen by the experimenter (opposite-seeing-drawing); 3) how it is seen by the dall that is sitting left side to the child (side-seeing-drawing).

RESULT

Drawings were classified as correct if a red circle was drawn in the picture that meant how the ball was seen by the child, if a blue circle was drawn in the picture that meant how the ball was seen by the experimenter, and if a circle, whose left semicircle was red and whose right semicircle was blue, was drawn in the picture that meant how the ball was seen by the dall.

Table 1 shows the number of children at each age level who were categorized as correct and error. The number of children classified as correct in each condition increased according to ages (seeing drawing: $x^2=7.18$, df$=2$, $p<.05$; opposite-seeing-drawing: $x^2=12.53$, df$=2$, $p<.01$; side-seeing-drawing: $x^2=14.62$, df$=2$, $p<.01$).

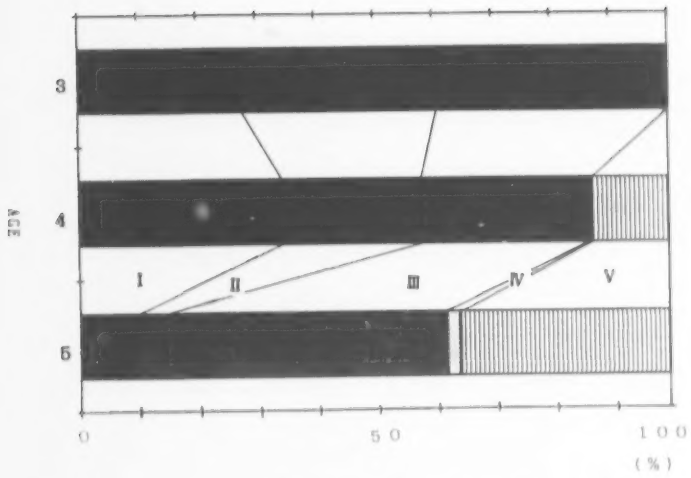
Drawings classified as correct for the picture from the child were analized to investigate how their perspectives of others were. McNemer test for correlated proportions was used to examine the significance of the difference in the correct proportions for the number of opposite-seeing-drawing and of side-seeing-drawing for each age group. All differences are signifficant (aged 3: $z=3.33$, $p<.01$; aged 4: $z=3.02$, $p<.01$; aged 5: $z=3.93$, $p<.01$). This means that to draw a picture as it is seen to the child from the opposite side is easier than to draw a picture as it is seen from the side of the child. (See fig. 1)

The number of children at each level who were categorized the error patterns is shown in Table 2. Incorrect drawings of opposite-seeing-drawings in the groups aged 3 and aged 4 were effected by the seeing of the child, not so for those aged 5($x^2=2.80$,

TABLE 1

Number of Children at each level showing correct and error drawing

	Age	3	4	5	Total
Seeing-drawing	Correct	24	25	38	87
	Error	9	13	4	26
Opposite-seeing-drawing	Correct	13	16	36	65
	Error	20	22	6	26
Side-seeing-drawing	Correct	0	7	18	25
	Error	33	31	24	88



I : Children who made no correct drawing
II : Children who made correct dawing to only seeing drawing
III : Children who made correct drawings to seeing drawing and oppsite seeing drawing
IV : Children who made correct drawings to seeing drawing and side seeing drawing
V : Children who made correct drawings to all

Fig. 1 Proportion of children showing consistent correct response

TABLE 2

Number of children at age level showing error drawing patterns

Opposite seeing drawing Age	3	4	5
same drawing as seeing drawing	6	5	0
etc.	5	4	3

Side seeing drawing Age	3	4	5
same drawing as seeing drawing	11	9	1
same drawing as opposite drawing	7	2	0
reverse (left right)	3	7	11
reverse (up down)	0	0	5
etc.	2	2	5

df=2, $p<.05$.). Incorrect drawings of side-seeing-drawing in the groups aged 3 and aged 4 were effected by the seeing of the child or by the seeing of experimenter, not so for those of aged 5($x^2=30.61$, df=2, $p<.05$).

Most of children who categorized as error drew either a circle whose left semicircle was blue and whose right semicircle was red, or a circle in which the one semicircle was upside and the other was downside.

DISCUSSION

The result, which corrects proportions of both seeings of others, increases as they grow, and suggests that understanding of others' seeings is promoted as the children grow.

Analizing of incorrect responses, the result showed many of children who responded incorrectly to opposite seeing drawing, responded incorrectly to side seeing drawing, but few of the children who responded incorrecoly to side seeing drawing responded incorrectly to opposite seeing drawing. This suggests that inferencing seeing of the opposite is easier than that of the side. It would be possible for factors of either (real person or not) or where the other is (opposite or side to the child) as well as the factor of how many colors the other sees.

Children may come to understand other's seeings are different from their first seeings, then come to understand how others see the same object they see. Also it may be possible to infer how the other sees, who is the other, and where is the other for children. This might be important.

Drawings of children aged 3 and 4 that were not correct for opposite seeing drawing showed misleading representation effected by their own seeing, and side seeing drawings were effected by either their own seeing or oppsite seeing. However, neither oppposite seeing drawing nor side seeing drawing of children aged 5 were effected by seeing of anyone, rather those seems to be errors in their expression on the papers. Many of the incorrect responses by children aged 5 to side seeing drawing showed the ball left semicircle blue and right semicircle red. These results suggest children aged 3 and 4 are on the way to understand other's seeing. They could understand other's seeing was different from their seeing, but could not understand how others see. As contrasted to it, children aged 5 seem to understand other's seeing is different from their seeing and they understand how others see, but they could not completely understand their view.

REFERENCE

Flavell, J. H. (1974). The development of inferences about others. In T. Mischel (Ed.), *Understanding other persons* (pp. 66-116). Oxford: Blackwell.

Flavell, J. H. (1978). The development of knowledge about visual perception. In C. B. Keasey (Ed.), *Nebraska symposium on motivation* (Vol. 25, pp. 43-76). Lincoln: University of Nebraska Press.

Freeman, N. H., & Janicoun, R. (1972). Intellectual realism in children's drawings of a familiar object with distinctive features. *Child Development*, **43**, 1116-1121.

Phillips, W. A., Hobbs, S. B., & Pratt, F. R. (1978). Intellectual realism in children's drawing cubes. *Cognition*, **6**, 15-33.

Masangkay, Z. S., McCluskey, K. A., McIntre, C. W., Sims-Knight, J., Vaughn, B. E., & Flavell, J. H. (1974). The early development of inferences about the visual percepts of others. *Child Development*, **45**, 357-366.

A QUEST FOR PARENTAL LOVE : HOW DO JAPANESE MOTHERS CONCEIVE MOTHER'S LOVE ?

Kunio Wakai
Hokkaido University

I. Where the Research Question Resides.

As stated often, Japanese families have experienced drastic changes both in the structure and the function after World War II. Remarkable are the decrease of the extended families and the increase of the nuclear. Many are leading a lonesome life in isolated families shrinked in size. Equally noteworthy is the rapid drop of the 'total fertility'; it is reported to be only 1.53 in the 1990 national census. One may wonder if the words 'brothers', 'sisters', and 'siblings' are determined to become meaningless in Japan before long.

Turning to the psychopathology of Japanese society, fathers are said to have lost their authority and power in their homes, and mothers are put in the position almost exclusively responsible for childrearing and household. Clinical psychologists suspect that the confusion or even the reversion of the 'paternal principles' and 'maternal principles' is responsible for the troubles and difficulties in modern Japanese families.

By 'paternal principles' are meant 'decisiveness', 'rigorousness', 'determinedness', 'rationality', 'authoritative', 'discernibleness', or other masculine characteristics which govern the typical father's attitudes. 'Maternal principles', on the other hand, mean fundamental feminine orientations which characterize the typical attitudes in mothers, such as 'warm', 'embracing', 'irrational', 'accepting', 'permissive', 'indecisive', and 'emotional'.

Because of the unprecedented changes of societal structure and values, and probably for many other inexplicable reasons in Post War times, Japanese fathers have come to lose their direction and status in family, and mothers are forced to execute the roles which were once for fathers. Confusion and collapse of underlying principles in a family cannot help inducing problems and deterioration of parent-child relationship. Thus, some ten years ago or so, mass media brought us weekly dozens of case reports about home violence, in which children attack their parents to be hurt seriously or even to death. Fathers and mothers, particularly young parents, have come to grow up only physically without well-preparedness to be parents, and abuse their childen. A pediatrist in Kobe once labeled those parents as 'immature parents'.

Starting from the totally desperate conditions, Japan has achieved unimaginable

Request for reprint should be addressed to Kunio Wakai, Faculty of Education, Hokkaido University, Sapporo, 060, Japan.

recovery in economy and come to be flattered as 'Number One' in the world. Indeed, Japan is now an affluent society and people are living their lives as real wasting consumers.

People who really mind our society, however, claim that although Japan is indeed rich in a physical sense, but Japanese are poor in their mind. There is a big gap between materialistic richness and mental poverty.

And conscientious people worry particularly about inner world of Japanese youngsters who are responsible for the future of Japan. Educators and psychologists often talk about 'kindness', 'conpassionate', 'sympathy', and 'empathy' and also of 'love'.

In connection with the 'paternal' and 'maternal principles', it might be appropriate to refer here to the ideal figures of parents in traditional Japanese culture. When asked to play free association, Japanese would typically think of 'Nurturant Mother, Strict Father'. This is indeed a cultural stereotype, but not necessarily of no practical significance. Japanese children say in unison that they want their fathers to be more 'strict' and 'directive', and their mothers be 'warm' and 'caring'. The ideal fathers and mothers can also be seen in home dramas on TV. Stereotypes or ideal pictures of parental figures are of course the products of human minds and held in people's mental sphere. Here, speaking of people's mental sphere is almost equal to discussing belief systems.

The very starting point of the present study was a rather naive interest in obtaining some first-hand data on belief systems among Japanese parents.

II. The Purpose of the Present Study.

From what have been said so far, the purpose of this study should be clear. We wanted to get direct data on Japanese parental belief systems concerning some aspects of parental attitudes and childrearing.

As the first step, we decided to make an analytical approach to maternal love, by using several types of questionnaire. The expected results of this study should be modest in that it deals with only conceptual framework of maternal attitudes without practical information on behaviors. We do not assume any simple correspondence between thoughts and behaviors. But, we do believe it *is* possible for belief systems to exert significant influences on behaviors under certain conditions. Undoubtedly, information on psychological world facilitates our understanding on behaviors and people. Researchers who found similarities and differences in overt behaviors with their subjects, would certainly want to have data on the subjects' mental life. It is not without reason that psychology is said to be a science of behavior and awareness (including the 'unconscious', needless to say, though). Here we may recollect the often-cited study by Caudill and Weinstein (1969). The authors hypothesized that cultural differences in maternal care and mother-child interaction reflect defferences in maternal conception of the infant between Japan and America.

It is not our job here to discuss the issues of inter-relationship of conception and behavior. But we believe that investigators need data and information on conceptual (mental, subjective) realm of their target subjects, if they really want to get better

understanding on the subjects' behaviors and development.

One of the present author's criticisms on the contemporary research in parent-child interaction is that the researchers over-emphasize the 'reciprocity' or 'mutuality' of the interacting two behavior agents. To the present author's eyes, this is too simple-minded and unrealistic.

A parent, as an adult, is never equated to a child or an infant. The two are quite different in many ways. The former has a long history of experience and is a human exsistence with manifold dimensions of behavioral and psychological functioning; the latter has only a short history of life and is much simpler existence. The former is responsible for taking care of the latter as well as being competent to perform the role. The latter is much less competent in comparison, and be in the position to be taken care of. One knows better the other, and never the reverse. To use a convenient term, the 'discretion' of parents is uncomparably larger than that of children. Mental abilities or psychological powers are of course the forms of the 'discretion'.

Thus, research in parent-child interaction which totally neglect the dimension of 'discretion' in the acting agents, should be criticized as simple-minded and invalid. And here, we can see the significance of the data on parental belief systems or conceptual framework.

It should be stressed here, however, that by saying the above, the present author is not going to deny that parents can be influenced by their children. But, the key point here is that the ways and the effects of the influences from children are mostly defined by the parental 'discretion'. It is possible for parents to get influenced by their children *only because* that parents are capable to sense and understand the meanings of their children's behaviors and states (both physical and mental).

III. Methods

1. Subjects.

Our target subjects were 175 mothers whose children were enrolled in a kindergarten attached to a national univeristy in Hyogo Prefecture. Some of their back-

TABLE 1 Background characteristics of mothers.

Age			Education			No. of children		
Class	Freq.	%	Level	Freq.	%	No.	Freq.	%
~25	1	0.6	H	34	19.5	1	23	13.1
26~30	22	12.6	JC	54	30.9	2	107	61.1
31~35	100	57.1	VS	9	5.1	3	40	22.9
36~40	42	24.0	U	72	41.1	4	4	2.3
41~45	9	5.1	G	4	2.3	NA	1	0.6
NA	1	0.6	NA	2	1.1			
Total	175	100.0	Total	175	100.0	Total	175	100.0

Notes 1) NA; No answer, 2) Freq.; Frequency.
3) Educational level; H: Up to senior high, JC: Junior college, VS: Vocational school, U: University, G: Graduate school.

ground information are given in Table 1.

For the purpose of comparison, 37 students were recruited from a technical school of public health and nursing in Kobe. They were all female and some of them were married. Their ages and educational levels correspond roughly to those of the senior year students in a regular Japanese university. After graduation, almost all of them usually find a job as health nurses at public health centers or in schools in each community. They receive rather intensive and extensive trainings in care for mothers and infants in addition to more professional medical care and services.

2. Tools of assessment.

All data in this report were collected by the following three types of questionnaire.

1) Questionnaire I. Free association on "Mother's love".
Subjects were asked to put down on a sheet of paper what they thought of when they hear or read the words "Mother's love" (See Appendix A).

2) Questionnaire II. Agreement/disagreement to the statements concerning "Mother's love" and some other related ideas (See Appendix B).
For this form, the subjects were asked to rate on 7-point scales to what extent they agree or disagree to each of 50 statements concerning parent-child relationship and child development.
Through several preliminary surveys and discussions, a total 10 categories were provided to represent major dimensions of "Mother's love" or related maternal feelings and attitudes.
The ten categories are as follows;

A. Nature and contents of "Mother's love".
B. Objects and status of "Mother's love".
C. View on a child and child development.
D. Mother-child relationship.
E. Origin and making of "Mother's love".
F. Manifestation of "Mother's love".
G. Function and effects of "Mother's love".
H. Work and "Mother's love".
I. Communication and technique to express "Mother's love".
J. Conditions and prerequisites of "Mother's love".

For each of the above caetegories, five statements were provided, thus resulted in a total 50 statements.

3) Questionnaire III: Semantic differential type rating of "Mother's love" (See Appendix C).

The subjects were also asked to rate "Mother's love" on seven-point scales in the light of a total 55 pairs of contrastive adjectives. Those 55 pairs are classified into 11 categories as follows;

A. Potency (strong vs. weak).
B. Activity (active vs. static)
C. Innateness (innate vs. learned)
D. Abstractness (abstract vs. concrete)
E. Rationality (rational vs. irrational)
F. Openness (open vs. closed)
G. Stability (stable vs. unstable)
H. Fruitfulness (rewarding vs. non-rewarding)
I. Uniqueness (common vs. unique)
J. Neutral (clear vs. turbid)
K. Evaluation (noble vs. Ignoble)

IV. Results and Discussion.

The analysis of the results on Questionnaire I has not been completed yet, so in this report the focus will be put on the results of other two forms of questionnaire.

1. Results on Questionnaire II.

a) Mean scale score (MSS).

To grasp the overall picture of the responses to Questionnaire II, we computed 'mean scale score' (MSS) for each item (statement) for each group of subjects. Here, each point on each seven-point scale (statement) is taken as a scale point respectively, and a MSS is obtained by dividing the sum of the scale points on each scale by the total number of subjects for each group.

The results of this analysis are shown in Table 2. In order to make the results easier to read, we made Figures 1-a to 1-j.

To pick up some of the most salient tendencies in this results, Japanese mothers might be characterized as follows;

1) The Japanese mothers interpret "Mother's love" as "instinctive and gratuitous love" without expecting no return.
2) For them, childrearing is joyful and rewarding job, even if some difficulties accompany it.
3) A baby is seen as an independent and separate being from mother, and nobody has the right to kill the baby for any reason.
4) A child is born with potentials or competence to grow and develop, and stimulation from environment help the child to exploit the potentials.
5) Scolding a child is not always bad, and a hild should be scolded severely when necessary. (This may be taken as to show that Japanese mothers are rather practical in their childrearing practices, and this is somewhat different from what we expected.)

Another interesting finding is the difference between mothers and students. As seen in Figures 1-a to 1-j, the student subjects showed more clear-cut attitudes than mothers to most items. Presumably because of their lack of actual experiences in delivering and rearing a child, they have had more decisive and (in a sense) pure judgments.

TABLE 2 Mean scale scores (MSS) and standard deviations (SD) and the results of t-test for Questionnare II.

Category	Item No.	Mothers		Students		t value	p
		MSS	SD	MSS	SD		
A. Nature & contents of "mother's love".	1	2.05	1.02	2.42	1.11	1.962	
	6	2.25	1.50	2.08	1.63	0.613	
	11	3.09	1.52	3.42	1.83	1.151	
	16	2.75	1.61	2.47	1.50	0.964	
	21	3.91	1.85	4.22	2.04	0.904	
B. Objects & status of "mother's love".	2	2.52	1.47	3.42	1.73	3.262	**
	7	4.20	1.38	3.50	1.56	2.724	**
	12	3.87	1.60	3.56	1.76	1.046	
	17	4.36	1.68	3.92	1.78	1.423	
	22	4.67	1.66	4.44	1.71	0.757	
C. View on a child & child development.	3	4.02	2.18	3.72	2.19	0.754	
	8	2.50	1.35	1.50	0.70	4.319	**
	13	2.11	1.12	1.50	0.70	3.142	**
	18	1.90	1.00	2.03	1.38	0.533	
	23	6.13	1.02	6.56	0.84	2.373	**
D. Relationship with a child.	4	4.93	1.62	4.83	1.93	0.328	
	9	4.97	1.60	5.00	1.55	0.103	
	14	1.72	1.01	1.89	1.56	0.622	
	19	5.58	1.75	4.42	2.20	2.954	**
	24	2.08	1.54	3.17	1.84	3.760	**
E. Origin & formation of "mother's love".	5	4.27	1.79	5.25	1.63	3.045	**
	10	2.51	1.56	2.92	1.95	1.177	
	15	3.67	1.84	3.69	1.83	0.060	
	20	3.88	1.67	3.42	1.68	1.510	
	25	5.08	1.60	4.89	1.60	0.652	
F. Manifestation of "mother's love".	26	3.17	1.51	2.22	1.24	3.543	**
	31	5.57	1.33	5.22	1.69	1.162	
	36	4.06	1.51	5.42	1.32	5.035	**
	41	4.28	1.65	4.00	1.49	0.945	
	46	3.03	1.30	2.58	1.18	1.926	
G. Function & effects of "mother's love".	27	2.71	1.35	2.81	1.88	0.301	
	32	1.79	1.15	1.67	0.72	0.602	
	37	2.35	1.29	1.81	0.82	2.412	**
	42	3.70	1.72	2.81	1.64	2.859	**
	47	2.28	1.25	1.83	1.25	1.975	*
H. "Mother's love" and work.	28	3.47	1.76	3.97	2.16	1.500	
	33	4.60	1.70	3.89	1.75	2.281	**
	38	4.77	1.67	4.83	2.14	0.157	
	43	4.84	1.35	4.58	1.40	1.050	
	48	3.29	1.52	3.03	1.66	0.925	
I. Communication and techniques to express "mother's love".	29	2.90	1.73	2.31	1.67	1.881	
	34	3.88	1.76	4.86	1.87	3.025	**
	39	3.25	1.51	2.61	1.46	2.337	**
	44	3.24	1.65	3.19	1.65	0.166	
	49	3.70	1.60	3.28	1.30	1.480	
J. Conditions or prerequisites of "mother's love".	30	5.90	1.02	6.19	1.17	1.523	
	35	2.04	1.38	1.64	1.05	1.645	
	40	4.62	1.66	4.19	2.07	1.163	
	45	5.28	1.44	4.92	1.48	1.366	
	50	4.09	1.69	4.36	1.73	0.873	

* $p<.05$; ** $p<.01$

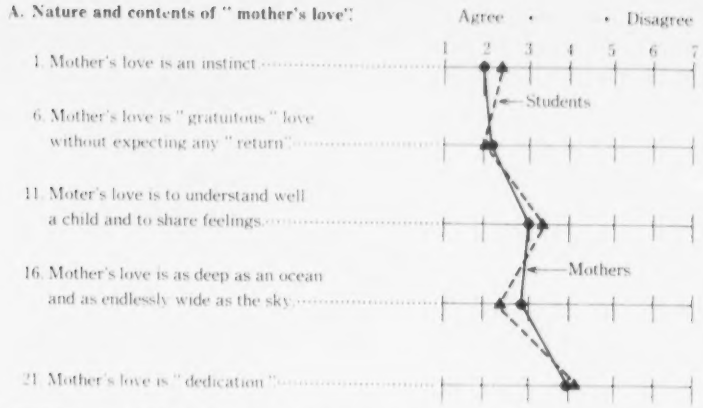

A. Nature and contents of " mother's love":
Agree
Disagree
1 2 3 4 5 6 7
1. Mother's love is an instinct
6. Mother's love is " gratuitous " love without expecting any " return"
11. Moter's love is to understand well a child and to share feelings
16. Mother's love is as deep as an ocean and as endlessly wide as the sky
21. Mother's love is " dedication "
Students
Mothers

FIGURE 1-a MSS for mothers and students in Category A of Questionnaire II.

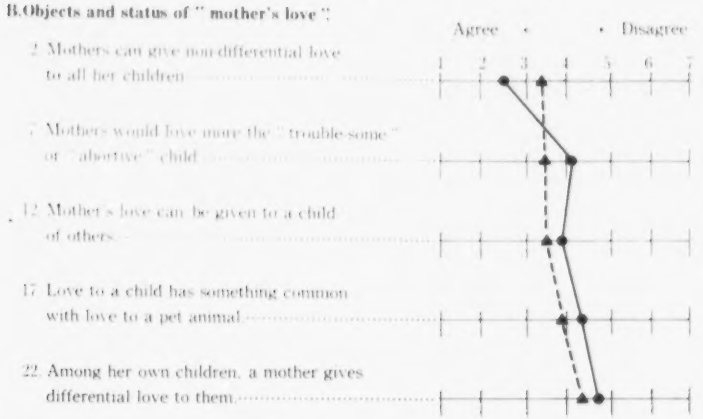

B. Objects and status of " mother's love ":
Agree
Disagree
1 2 3 4 5 6 7
2. Mothers can give non-differential love to all her children
7. Mothers would love more the " trouble-some " or " abortive " child
12. Mother's love can be given to a child of others
17. Love to a child has something common with love to a pet animal
22. Among her own children, a mother gives differential love to them

FIGURE 1-b MSS for mothers and students in Category B of Questionnaire II.

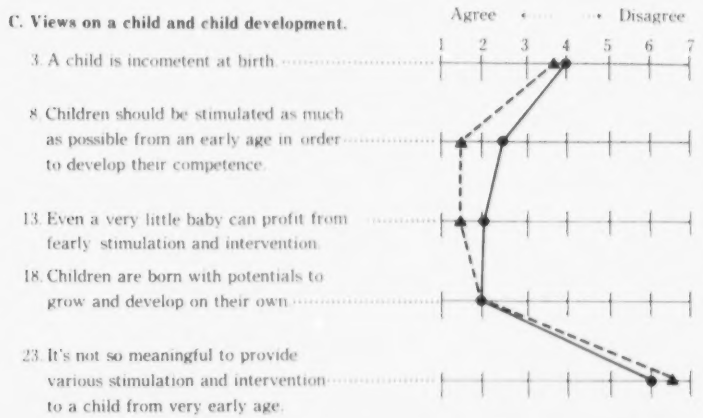

C. Views on a child and child development.
Agree
Disagree
1 2 3 4 5 6 7
3. A child is incometent at birth
8. Children should be stimulated as much as possible from an early age in order to develop their competence
13. Even a very little baby can profit from fearly stimulation and intervention
18. Children are born with potentials to grow and develop on their own
23. It's not so meaningful to provide various stimulation and intervention to a child from very early age.

FIGURE 1-c MSS for mothers and students in Category C of Questionnaire II.

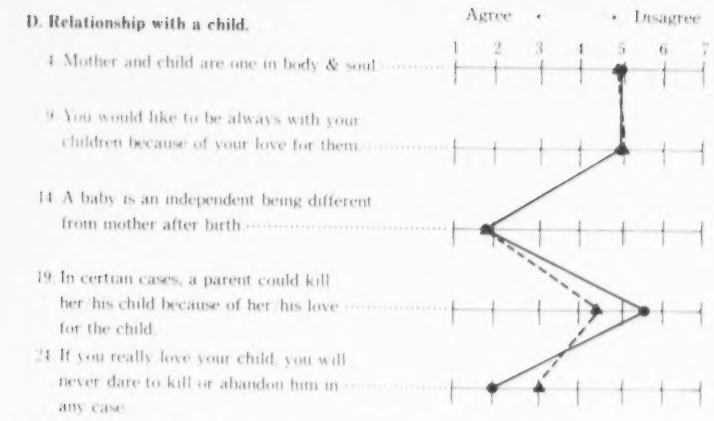

D. Relationship with a child.
Agree
Disagree
1 2 3 4 5 6 7
4. Mother and child are one in body & soul
9. You would like to be always with your children because of your love for them
14. A baby is an independent being different from mother after birth
19. In certian cases, a parent could kill her/his child because of her/his love for the child.
24. If you really love your child, you will never dare to kill or abandon him in any case

FIGURE 1-d MSS for mothers and students in Category D of Questionnaire II.

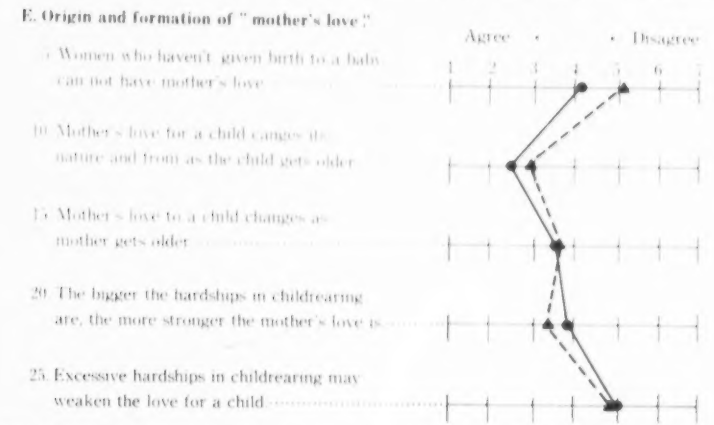

E. Origin and formation of "mother's love"
Agree
Disagree
1 2 3 4 5 6 7
5. Women who haven't given birth to a baby can not have mother's love
10. Mother's love for a child changes its nature and from as the child gets older
15. Mother's love to a child changes as mother gets older
20. The bigger the hardships in childrearing are, the more stronger the mother's love is
25. Excessive hardships in childrearing may weaken the love for a child

FIGURE 1-e MSS for mothers and students in Category E of Questionnaire II.

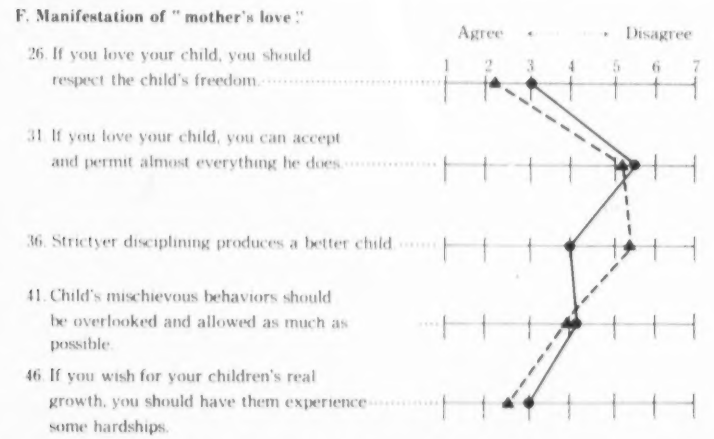

F. Manifestation of "mother's love"
Agree
Disagree
1 2 3 4 5 6 7
26. If you love your child, you should respect the child's freedom
31. If you love your child, you can accept and permit almost everything he does
36. Strictyer disciplining produces a better child
41. Child's mischievous behaviors should be overlooked and allowed as much as possible
46. If you wish for your children's real growth, you should have them experience some hardships.

FIGURE 1-f MSS for mothers and students in Category F of Questionnaire II.

BEST COPY AVAILABLE

G. Function and effects of " mother's love ":

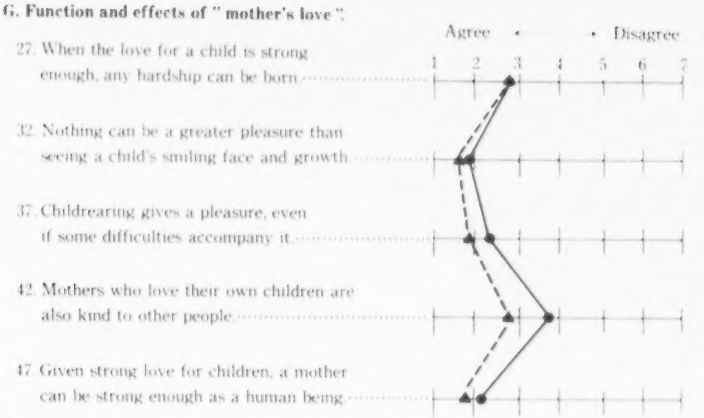

Agree
Disagree
1 2 3 4 5 6 7
27. When the love for a child is strong enough, any hardship can be born
32. Nothing can be a greater pleasure than seeing a child's smiling face and growth
37. Childrearing gives a pleasure, even if some difficulties accompany it
42. Mothers who love their own children are also kind to other people
47. Given strong love for children, a mother can be strong enough as a human being

FIGURE 1-g MSS for mothers and students in Category G of Questionnaire II.

H. " Mother's love " and work.

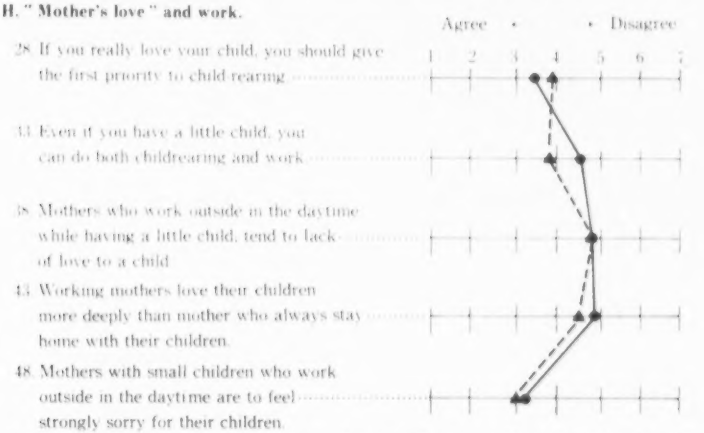

Agree
Disagree
1 2 3 4 5 6 7
28. If you really love your child, you should give the first priority to child rearing
33. Even if you have a little child, you can do both childrearing and work
38. Mothers who work outside in the daytime while having a little child, tend to lack of love to a child
43. Working mothers love their children more deeply than mother who always stay home with their children.
48. Mothers with small children who work outside in the daytime are to feel strongly sorry for their children.

FIGURE 1-h MSS for mothers and students in Category H of Questionnaire II.

I. Communication and techniques to express " mother's love ":

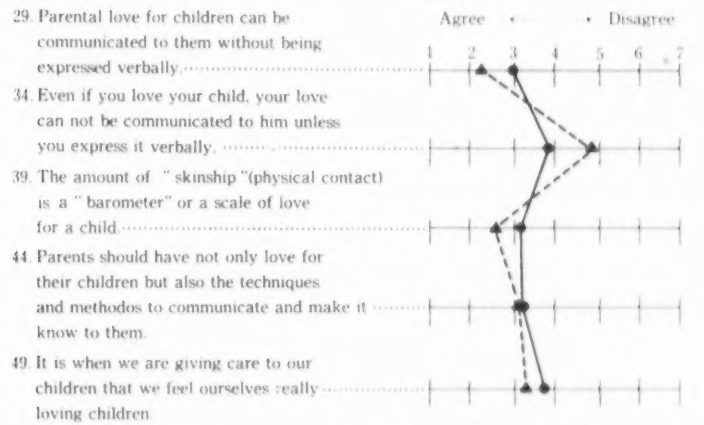

Agree
Disagree
1 2 3 4 5 6 7
29. Parental love for children can be communicated to them without being expressed verbally.
34. Even if you love your child, your love can not be communicated to him unless you express it verbally.
39. The amount of " skinship "(physical contact) is a " barometer" or a scale of love for a child.
44. Parents should have not only love for their children but also the techniques and methodos to communicate and make it know to them.
49. It is when we are giving care to our children that we feel ourselves really loving children.

FIGURE 1-i MSS for mothers and students in Category I of Questionnaire II.

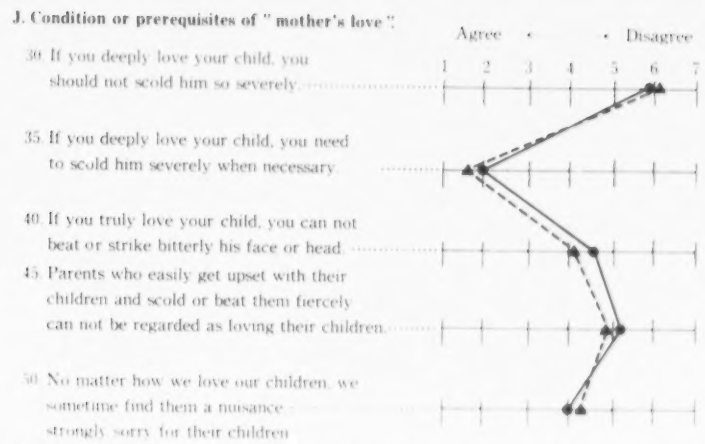

J. Condition or prerequisites of "mother's love":
Agree
Disagree
1 2 3 4 5 6 7
30. If you deeply love your child, you should not scold him so severely.
35. If you deeply love your child, you need to scold him severely when necessary.
40. If you truly love your child, you can not beat or strike bitterly his face or head.
45. Parents who easily get upset with their children and scold or beat them fiercely can not be regarded as loving their children.
50. No matter how we love our children, we sometime find them a nuisance strongly sorry for their children

FIGURE 1-j MSS for mothers and students in Category J of Questionnaire II.

b) Relative frequency of responses.

In order to see the overall characteristics of the subjects' attitudes from a little different perspective, relative frequency of their responses to each item in the Questionnaire II was calculated. The result is shown in Table 3. By its nature, this treatment is to endorse the findings mentioned above.

c) Comparison between mothers and students.

With the help of the results of t-test shown in Table 2, let's look at how mothers and students differ in their conceptional framework of 'Mother's love' and other related domains of their attitudes. For the purpose of saving space, the results of this analysis are summarized in Table 4.

2. Results of Questionnaire III.

The data on Questionnaire III were processed by the same procedures as for Questionnaire II.

a) Mean scale score (MSS).

Based on MSS for each item on Questionnaire III, "Mother's love" in our mother subjects' conceptual space is characterized in the following way; a "strong, deep, heavy, consistent" psychlogical state, and an "embracing, soft, broad-minded, practical, logic-free and fruitful" feeling, and also "joyful, good, noble, beautiful" affection, which is "natural and unique" to women. (See Table 5 and Figure 2-a to 2-k).

b) Relative frequency in Questionnaire III (See Table 6).

Table 6 shows somewhat different patterns of relative frequency of the responses to Questionnaire III between mothers and students.

c) Comparison between mothers and students.

Following the same line of thinking as for Questionnaire II, let's summarize here the contrastive picture of the responses by the two groups of subjects for Questionnaire III.

TABLE 3 Relative frequencies of responses on Questonnaire II.

Category	Item No.	Mothers							Students						
		Scale point							Scale point						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
A	1	29.9	46.4	14.4	2.6	3.6	1.0	2.1	13.9	50.0	27.8	0	5.6	2.8	0
	6	40.7	27.3	10.8	7.7	7.2	2.6	1.5	50.0	30.6	5.6	0	2.8	11.1	0
	11	13.9	26.8	22.7	13.9	12.9	5.7	2.1	13.9	27.8	19.4	0	22.2	13.9	2.8
	16	25.3	27.3	16.5	14.4	7.7	3.1	3.6	30.6	30.6	22.2	0	11.1	5.6	0
	21	13.9	11.3	14.9	13.4	25.3	10.3	8.8	11.1	13.9	16.7	8.3	19.4	11.1	19.4
B	2	25.8	34.0	20.1	5.2	8.2	2.6	2.1	11.1	33.3	11.1	2.8	33.3	5.6	2.8
	7	2.1	7.7	21.6	26.3	22.7	11.9	5.2	5.6	22.2	38.9	0	16.7	16.7	0
	12	4.6	12.4	34.5	14.9	12.9	10.8	7.7	8.3	19.4	38.9	2.8	11.1	11.1	8.3
	17	3.6	10.3	19.6	17.5	20.1	13.9	12.9	8.3	13.9	27.8	8.3	19.4	13.9	8.3
	22	2.1	5.2	23.2	16.0	15.5	18.0	18.0	2.8	5.6	36.1	2.8	19.4	19.4	13.9
C	3	21.6	11.3	8.8	4.6	17.5	21.6	12.4	19.4	25.0	8.3	0	13.9	25.0	8.3
	8	26.3	29.4	22.2	8.8	8.8	1.5	1.0	61.1	27.8	11.1	0	0	0	0
	13	35.6	28.9	24.2	6.2	1.5	1.0	0.5	66.7	19.4	13.9	0	0	0	0
	18	40.7	35.1	17.5	2.1	1.5	1.0	0	47.2	25.0	19.4	0	5.6	0	2.8
	23	0	1.5	1.0	2.1	17.0	33.0	43.3	0	0	2.8	0	5.6	22.2	69.4
D	4	2.6	7.2	13.4	7.7	24.2	26.8	16.0	5.6	16.7	5.6	0	25.0	27.8	19.4
	9	3.1	6.2	11.9	7.2	26.3	27.3	16.0	0	8.3	16.7	0	33.3	25.0	16.7
	14	54.6	24.2	12.9	4.1	1.5	0.5	0	66.7	11.1	5.6	5.6	8.3	0	2.8
	19	2.1	5.7	8.8	12.4	6.7	15.5	46.9	13.9	5.6	27.8	0	8.3	19.4	25.0
	24	53.6	18.0	5.2	9.3	7.7	3.1	0.5	22.2	27.8	11.1	2.8	22.2	13.9	0
E	5	8.8	10.3	14.9	9.3	28.9	15.5	10.3	2.8	2.8	16.7	0	25.0	27.8	25.0
	10	25.8	36.6	21.1	2.1	3.6	5.2	3.6	33.3	25.0	5.6	2.8	22.2	8.3	2.8
	15	8.8	22.2	24.2	10.3	11.3	11.3	9.8	8.3	22.2	27.8	5.6	13.9	13.9	8.3
	20	7.2	17.0	19.6	14.4	23.7	9.3	6.7	8.3	25.0	33.3	2.8	16.7	8.3	5.6
	25	1.0	4.1	18.6	9.8	13.9	29.4	21.1	2.8	0	27.8	2.8	25.0	25.0	16.7
F	26	10.3	30.9	22.2	9.8	16.5	7.2	1.0	30.6	33.3	30.6	0	2.8	0	2.8
	31	1.0	2.1	7.2	6.7	21.1	35.1	24.7	2.8	11.1	5.6	0	22.2	38.9	19.4
	36	3.6	13.9	18.0	22.2	21.6	14.4	4.1	0	0	16.7	2.8	22.2	38.9	19.4
	41	2.1	14.4	20.1	13.4	20.6	17.5	9.8	0	16.7	33.3	5.6	25.0	16.7	2.8
	46	11.9	20.1	37.1	13.9	9.8	4.6	0.5	11.1	41.7	38.9	0	5.6	0	2.8
G	27	17.5	35.6	19.6	9.3	13.9	1.5	0.5	30.6	27.8	13.9	2.8	13.9	5.6	5.6
	32	51.0	32.0	8.2	2.1	2.1	2.1	0.5	47.2	38.9	13.9	0	0	0	0
	37	28.4	32.5	24.2	5.7	4.1	2.1	1.0	44.4	30.6	25.0	0	0	0	0
	42	7.7	21.1	20.1	14.9	16.0	10.8	7.2	22.2	30.6	25.0	0	11.1	11.1	0
	47	28.9	35.1	20.6	8.2	2.1	2.1	1.0	52.8	27.8	13.9	0	0	5.6	0
H	28	14.4	19.6	19.1	13.9	13.9	13.4	3.6	19.4	16.7	8.3	0	25.0	19.4	11.1
	33	4.1	9.3	14.9	19.1	14.4	22.2	13.9	2.8	22.2	30.6	5.6	13.9	16.7	8.3
	38	3.1	5.7	18.6	10.3	21.6	20.6	18.0	11.1	11.1	8.3	2.8	13.9	25.0	27.8
	43	1.0	2.6	11.3	24.7	27.8	16.5	13.9	0	8.3	13.9	25.0	25.0	19.4	8.3
	48	10.8	22.2	24.7	16.0	14.9	7.2	2.1	19.4	22.2	30.6	5.6	11.1	8.3	2.8
I	29	21.1	30.9	19.1	4.1	12.4	6.2	4.1	41.7	30.6	8.3	5.6	5.6	5.6	2.8
	34	9.3	17.5	20.6	6.7	22.2	16.5	4.6	5.6	8.3	16.7	2.8	16.7	30.6	19.4
	39	10.8	21.1	32.0	8.2	17.5	6.2	2.1	16.7	47.2	16.7	5.6	8.3	2.8	2.8
	44	13.4	21.6	29.4	13.9	8.2	5.2	6.2	16.7	22.2	27.8	0	27.8	2.8	2.8
	49	7.7	17.0	23.2	14.4	21.6	8.8	5.2	5.6	16.7	52.8	2.8	13.9	8.3	0
J	30	0	1.5	3.1	2.1	20.1	42.3	28.4	0	0	5.6	2.8	16.7	16.7	58.3
	35	40.2	38.1	10.3	1.5	2.1	3.1	2.6	61.1	22.2	13.9	0	0	2.8	0
	40	5.7	8.2	10.8	10.3	31.4	21.1	10.3	11.1	19.4	11.1	5.6	16.7	22.2	13.9
	45	3.1	1.5	7.2	9.8	24.7	32.5	19.1	2.8	5.6	8.3	11.1	38.9	19.4	13.9
	50	4.6	8.2	32.5	15.5	11.9	12.4	12.9	2.8	5.6	38.9	2.8	22.2	11.1	16.7

TABLE 4 Mother-student comparison of responses on Questionnaire II.

Aspects of 'Mother's love'	M vs S	Item #
1. 'Evenness' of 'Mother's love'	M > S	2, 7
2. Effects of stimulation on child development	M < S	8, 13, 23
3. Respect for child's life	M > S	19, 24
4. Ubiquitousness of 'Mother's love'	M < S	5
5. Respect for child's freedom/tender discipline	M < S	26, 36
6. Belief in effectiveness of childrearing	M < S	37, 42, 47
7. Compatibitlity of childrearing and work	M < S	33
8. Explicit communication 'Mother's love'	M > S	34, 39

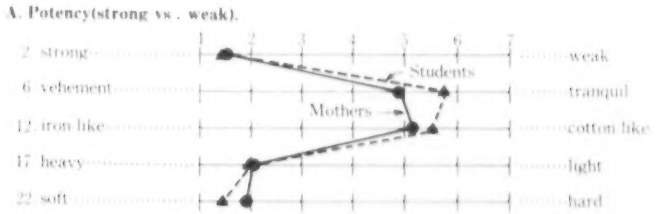


FIGURE 2-a MSS for mothers and students in Category A of Questionnaire III.

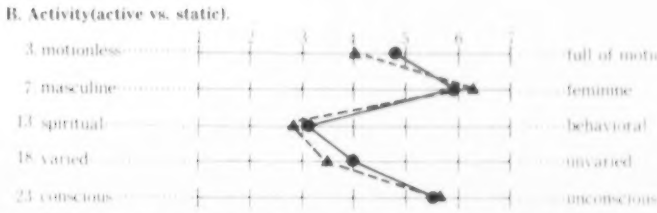


FIGURE 2-b MSS for mothers and students in Category B of Questionnaire III.

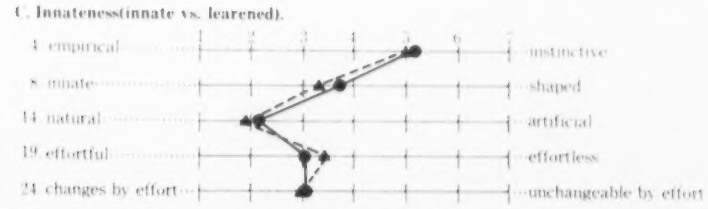


FIGURE 2-c MSS for mothers and students in Category C of Questionnaire III.

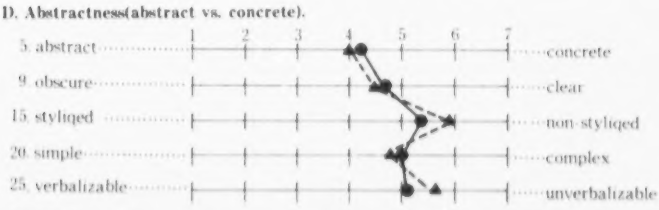


FIGURE 2-d MSS for mothers and students in Category D of Questionnaire III.

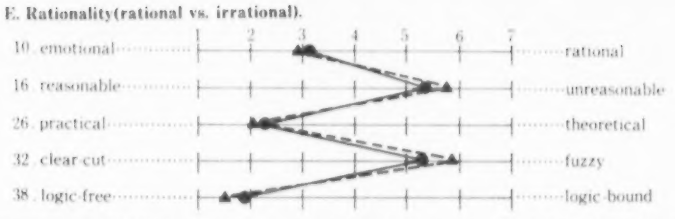

E. Rationality(rational vs. irrational).
1 2 3 4 5 6 7
10. emotional ..... rational
16. reasonable ..... unreasonable
26. practical ..... theoretical
32. clear-cut ..... fuzzy
38. logic-free ..... logic-bound

FIGURE 2-e MSS for mothers and students in Category E of Questionnaire III.

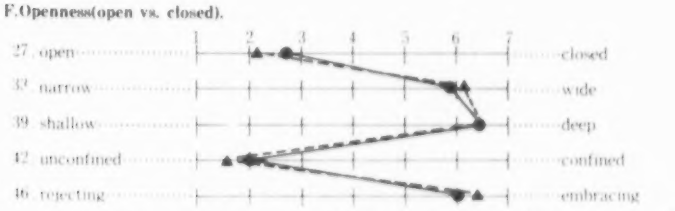

F.Openness(open vs. closed).
1 2 3 4 5 6 7
27. open ..... closed
33. narrow ..... wide
39. shallow ..... deep
42. unconfined ..... confined
46. rejecting ..... embracing

FIGURE 2-f MSS for mothers and students in Category F of Questionnaire III.

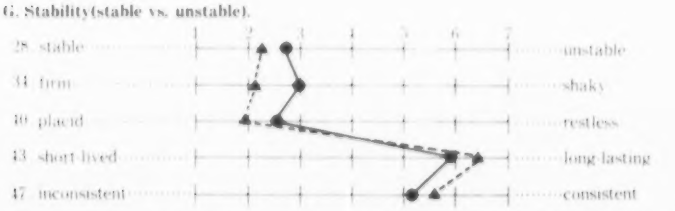

G. Stability(stable vs. unstable).
1 2 3 4 5 6 7
28. stable ..... unstable
34. firm ..... shaky
40. placid ..... restless
43. short-lived ..... long-lasting
47. inconsistent ..... consistent

FIGURE 2-g MSS for mothers and students in Category G of Questionnaire III.

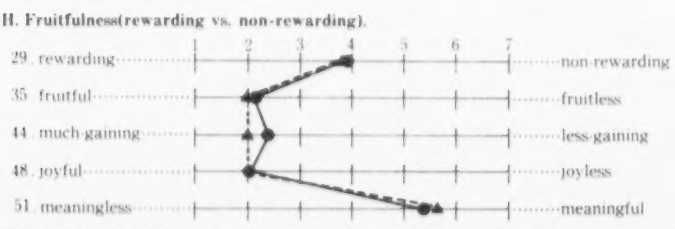

H. Fruitfulness(rewarding vs. non-rewarding).
1 2 3 4 5 6 7
29. rewarding ..... non-rewarding
35. fruitful ..... fruitless
44. much-gaining ..... less-gaining
48. joyful ..... joyless
51. meaningless ..... meaningful

FIGURE 2-h MSS for mothers and students in Category H of Questionnaire III.

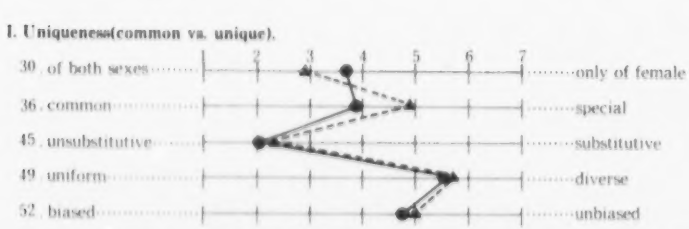

I. Uniqueness(common vs. unique).
1 2 3 4 5 6 7
30. of both sexes ..... only of female
36. common ..... special
45. unsubstitutive ..... substitutive
49. uniform ..... diverse
52. biased ..... unbiased

FIGURE 2-i MSS for mothers and students in Category I of Questionnaire III.

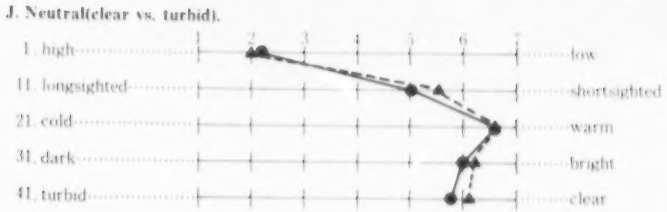


FIGURE 2-j MSS for mothers and students in Category J of Questionnaire III.

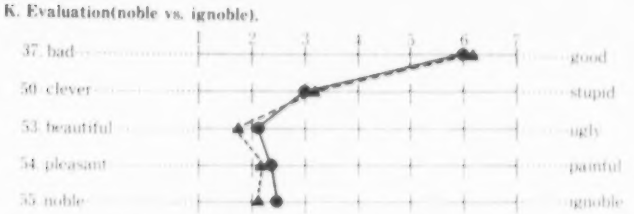

K. Evaluation(noble vs. ignoble).
1 2 3 4 5 6 7
37. bad ..... good
50. clever ..... stupid
53. beautiful ..... ugly
54. pleasant ..... painful
55. noble ..... ignoble

FIGURE 2-k MSS for mothers and students in Category J of Questionnaire III.

V. Summarizing Conclusion.

Major findings in this study are as follows;

1) It was shown that Japanese mothers conceive of "Mother's love" as "soft, embracing, broad-minded, practical, logic-free", and "stable, absolute, deep, natural, instinctive, highly-evaluated, gratuitous, womanly" affection toward a child.
2) Stutdent subjects showed more clear-cut, decisive attitudes than mothers toward "Mother's love" and childrearing, suggesting that the concept changes its meanings as the subjects' experiences and social status change.
3) Japanese mothers believe that a baby is a separate independent being, and born with potentials and capacities to grow and develop, and so is competent at birth. Environmental stimulation is seen as effective for an infant from a very early age.

2. Problems left for the future studies.

1) To the present author's best knowledge, there hasn't been any systematic psychological study on how Japanese mothers think of maternal love. Thus, it can be said that our initial purpose to get the firsthand data on them has been achieved at least to some extent. The findings reported here are, however, still preliminary and partial. In order to reach more solid conclusion, several replication studies are awaited.
2) Although it is not reported here, we did conduct factor analyses with the data from Questionnaire II and III for several sub-groups of the subjects. But the factors extracted were not so consistent and were difficult to name. To date, we haven't reached any solution for this. Subsequent studies will allow us a conclusion.

TABLE 5 Mean scale scores (MSS) and standard deviations (SD) and the results of t-test for Questionnare III.

Category	Item No.	Mothers		Students		t value	p
		MSS	SD	MSS	SD		
A. Potency	2	1.46	0.65	1.43	0.56	0.258	
(strong vs. weak)	6	4.82	1.82	5.77	1.31	2.978	**
	12	5.27	1.49	5.54	1.60	0.982	
	17	2.09	1.10	1.97	1.04	0.604	
	22	1.94	1.13	1.43	0.56	2.673	**
B. Activity	3	4.72	1.75	4.00	2.18	1.849	
(active vs. static)	7	5.81	1.16	6.26	1.13	2.137	*
	13	3.15	1.60	2.86	1.72	0.983	
	18	4.04	1.88	3.46	1.84	1.698	
	23	5.58	1.40	5.74	1.31	0.633	
C. Innateness	4	5.23	1.61	4.91	1.74	1.076	
(innate vs. learned)	8	3.69	1.88	3.31	1.78	1.118	
	14	2.25	1.18	1.80	0.80	2.187	*
	19	3.05	1.85	3.43	1.97	1.115	
	24	3.12	1.69	3.00	1.70	0.389	
D. Abstractness	5	4.26	1.93	4.03	1.89	0.656	
(abstract vs. concrete)	9	4.62	1.74	4.49	1.84	0.406	
	15	5.35	1.59	5.91	1.50	1.949	
	20	4.99	1.81	4.74	2.03	0.743	
	25	5.19	1.73	5.63	1.46	1.428	
E. Rationality	10	3.21	1.61	2.91	1.67	1.016	
(rational vs. irrational)	16	5.38	1.33	5.71	2.09	0.902	
	26	2.32	1.10	2.09	0.89	1.179	
	32	5.38	1.40	5.89	1.08	2.065	*
	38	1.84	1.08	1.54	0.56	1.620	
F. Openness	27	2.69	1.28	2.14	0.97	2.440	**
(open vs. closed)	33	5.84	1.21	6.17	1.25	1.489	
	39	6.48	0.69	6.49	0.61	0.081	
	42	1.98	1.01	1.60	0.85	2.113	*
	46	6.09	1.09	6.43	0.81	1.775	
G. Stability	28	2.67	1.52	2.29	1.38	1.391	
(stable vs. unstable)	34	2.98	1.59	2.17	1.01	2.935	**
	40	2.51	1.36	1.91	0.95	2.524	**
	43	5.84	1.39	6.40	0.85	2.327	**
	47	5.25	1.65	5.57	1.56	1.073	
H. Fruitfulness	29	3.81	1.52	3.86	1.52	0.180	
(rewarding vs. nonrewarding)	35	2.21	1.33	1.97	0.95	1.030	
	44	2.40	1.58	2.00	1.19	1.439	
	48	2.13	1.24	2.14	1.26	0.044	
	51	5.37	1.65	5.66	1.39	0.987	
I. Uniqueness	30	3.62	1.86	2.83	1.62	2.376	**
(commom vs. unique)	36	3.82	1.81	4.80	1.68	3.003	**
	45	2.12	1.38	2.34	1.30	0.882	
	49	5.56	1.45	5.74	1.40	0.685	
	52	4.73	1.59	5.03	1.65	1.029	
J. Neutral	1	2.18	1.24	2.03	0.66	0.704	
(clear vs. turbid)	11	5.09	1.55	5.54	1.52	1.598	
	21	6.59	0.70	6.57	0.92	0.122	
	31	5.98	0.98	6.26	0.61	1.649	
	41	5.74	1.20	6.14	0.85	1.905	
K. Evaluation	37	5.96	1.08	6.23	0.79	1.424	
(noble vs. ignoble)	50	3.02	1.52	3.23	1.70	0.744	
	53	2.21	1.20	1.74	0.74	2.261	**
	54	2.35	1.22	2.23	1.00	0.554	
	55	2.51	1.18	2.17	1.04	1.609	

* $p < .05$; ** $p < .01$

TABLE 6 Relative frequencies of responses on Questonnaire III.

Category	Item No.	Mothers							Students						
		Scale point							Scale point						
		1	2	3	4	5	6	7	1	2	3	4	5	6	7
A	2	59.8	32.5	4.1	0.5	0	0	0	61.1	36.1	2.8	0	0	0	0
	6	6.7	9.8	6.2	12.4	17.5	27.3	17.5	0	2.8	5.6	5.6	16.7	33.3	36.1
	12	2.6	4.6	4.1	17.0	16.0	34.0	19.1	0	8.3	8.3	2.8	11.1	36.1	30.6
	17	33.5	35.6	15.5	8.2	3.1	0.5	0	33.3	50.0	8.3	2.8	5.6	0	0
	22	39.7	36.1	10.8	4.6	1.0	2.6	0	61.1	36.1	2.8	0	0	0	0
B	3	3.1	11.3	9.8	21.6	7.2	27.8	16.5	13.9	22.2	11.1	2.8	13.9	22.2	13.9
	7	0	0.5	4.6	13.9	13.4	30.4	34.5	0	0	5.6	5.6	0	30.6	58.3
	13	13.4	29.4	19.1	16.5	8.2	7.7	2.6	22.2	36.1	16.7	2.8	11.1	8.3	2.8
	18	5.7	22.2	12.4	17.0	11.9	16.0	12.4	8.3	38.9	11.1	5.6	16.7	16.7	2.8
	23	1.5	3.6	4.1	9.3	15.5	34.5	26.8	0	5.6	2.8	2.8	16.7	41.7	30.6
C	4	2.1	5.2	8.2	14.4	17.0	23.2	27.3	2.8	13.9	5.6	5.6	22.2	36.1	13.9
	8	14.9	19.1	11.9	16.0	12.4	16.5	6.2	19.4	22.2	19.4	8.3	16.7	11.1	2.8
	14	27.8	38.1	15.5	9.8	4.1	1.0	0	36.1	55.6	5.6	0	2.8	0	0
	19	21.6	24.7	22.7	4.6	7.2	10.3	6.2	22.2	13.9	22.2	2.8	16.7	16.7	5.6
	24	13.9	27.8	26.3	6.7	6.2	8.2	5.7	16.7	30.6	25.0	0	13.9	11.1	2.8
D	5	7.7	19.6	8.8	14.4	13.4	21.6	11.3	8.3	19.4	16.7	8.3	11.1	33.3	2.8
	9	3.6	8.2	14.9	18.6	13.4	23.7	14.9	2.8	13.9	25.0	5.6	13.9	25.0	13.9
	15	1.5	5.7	7.2	10.8	13.9	32.0	25.8	5.6	0	2.8	0	11.1	38.9	41.7
	20	2.6	10.8	8.2	12.4	13.9	23.7	25.8	5.6	16.7	16.7	0	11.1	27.8	22.2
	25	1.5	8.8	9.3	8.2	14.9	25.8	26.8	2.8	0	8.3	5.6	16.7	33.3	33.3
E	10	10.3	29.4	21.1	18.6	7.7	5.2	5.2	19.4	30.6	22.2	13.9	0	11.1	2.8
	16	1.0	3.6	4.1	15.5	20.6	32.5	20.1	0	5.6	2.8	2.8	16.7	44.4	27.8
	26	23.7	37.1	20.6	10.8	2.1	1.0	0	22.2	55.6	16.7	2.8	2.8	0	0
	32	2.6	3.1	4.1	11.3	20.6	34.5	19.1	0	2.8	0	2.8	25.0	36.1	33.3
	38	44.8	33.0	9.3	5.2	1.5	0.5	0.5	50.0	47.2	2.8	0	0	0	0
F	27	18.6	32.5	18.6	17.5	6.7	1.5	0	22.2	47.2	27.8	0	0	2.8	0
	33	0	1.5	3.6	7.7	12.4	37.1	33.0	0	2.8	5.6	0	5.6	36.1	50.0
	39	0	0	0.5	0.5	8.2	28.9	57.2	0	0	0	0	5.6	38.9	55.6
	42	36.1	36.1	15.5	5.2	0.5	2.1	0	52.8	38.9	5.6	0	2.8	0	0
	46	0.5	0.5	1.0	8.2	12.9	29.4	42.8	0	0	0	5.6	2.8	33.3	58.3
G	28	22.2	34.5	14.4	8.8	6.7	7.2	0.5	30.6	47.2	5.6	2.8	11.1	2.8	0
	34	17.5	29.4	14.4	10.8	16.0	5.2	1.5	25.0	50.0	16.7	2.8	5.6	0	0
	40	22.7	37.1	13.9	10.8	6.7	3.1	1.0	38.9	41.7	13.9	2.8	2.8	0	0
	43	1.5	3.1	0.5	8.2	12.4	31.4	37.6	0	0	2.8	0	5.6	36.1	55.6
	47	3.6	6.2	5.7	11.9	13.9	29.9	24.2	0	8.3	5.6	2.8	22.2	27.8	33.3
H	29	4.6	15.5	17.0	28.4	16.0	6.2	7.2	2.8	16.7	25.0	19.4	19.4	8.3	8.3
	35	36.6	28.9	15.5	7.7	4.1	2.1	0.5	36.1	41.7	16.7	2.8	2.8	0	0
	44	33.5	29.9	12.4	8.8	2.1	4.1	4.1	38.9	36.1	13.9	2.8	5.6	2.8	0
	48	34.0	33.0	19.1	4.1	1.5	0.5	2.6	30.6	41.7	19.4	2.8	2.8	0	2.8
	51	2.1	5.7	4.6	12.4	12.9	27.8	29.9	0	5.6	5.6	2.8	16.7	41.7	27.8
I	31	9.3	24.7	21.6	7.7	12.9	8.2	10.8	19.4	27.8	30.6	2.8	5.6	8.3	5.6
	36	10.8	14.9	16.5	19.6	10.3	15.5	7.2	2.8	8.3	16.7	5.6	19.4	33.3	13.9
	45	44.3	24.7	11.9	7.2	3.6	3.6	0.0	30.6	36.1	16.7	8.3	5.6	2.8	0
	49	1.5	3.6	3.6	9.3	14.4	36.1	26.8	0	8.3	0	2.8	19.4	38.9	30.6
	52	1.0	8.8	15.5	11.9	19.6	25.8	12.9	0	5.6	22.2	5.6	19.4	25.0	22.2
J	1	33.0	40.7	9.3	10.8	1.5	0.5	1.5	22.2	55.6	22.2	0	0	0	0
	11	2.1	4.6	9.8	16.5	19.6	25.3	19.1	2.8	5.6	2.8	2.8	22.2	38.9	25.0
	21	0	0.5	0	1.0	4.1	26.8	62.9	2.8	2.8	0	0	0	27.8	66.7
	31	0	0	1.0	8.8	13.9	39.7	32.0	0	0	0	0	8.3	55.6	36.1
	41	1.0	0.5	3.1	9.8	16.5	36.1	28.4	0	0	2.8	0	11.1	52.8	33.3
K	87	0.5	0	0.5	10.8	11.9	36.1	35.6	0	0	0	2.8	11.1	38.9	47.2
	50	18.6	23.7	17.5	19.6	10.3	3.6	2.1	19.4	19.4	19.4	11.1	25.0	2.8	2.8
	53	33.0	32.5	12.4	14.9	1.5	0.5	0.5	41.7	41.7	16.7	0	0	0	0
	54	28.4	32.0	16.0	13.9	4.6	0	0.5	25.0	36.1	30.6	5.6	2.8	0	0
	55	22.7	33.0	16.5	21.1	1.5	0	0.5	30.6	30.6	30.6	5.6	2.8	0	0

TABLE 7 Mother-student comparison of responses on Questionnaire III.

Dimensions of 'Mother's love'	M vs S	Item #
1. Tender and soft	M < S	6, 22
2. Feminine	M < S	7
3. Natural	M < S	14
4. Divisible	M < S	32
5. Open	M < S	27
6. Grand	M < S	42
7. Stable	M < S	34, 40, 43
8. Gender-free but special	M < S	30, 36
9. Beautiful	M < S	53

References

Caudill, W. and Weinstein, H. Maternal care and infant behavior in Japan and America. *Psychiatry*, 1969, 32, 12~34.

Sigel, I. E. (Ed) *Parental belief systems: The psychological consquences for children*. Lawrence Erlbaum Associates, 1985.

Ohinata, M. *A study of motherhood*. Kawashima-shoten, Tokyo, 1988. (In Japanese)

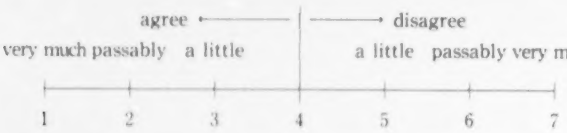
APPENDIX A Questionnaire I: Free association on "Mother's love".

What do you think of when you hear or read the words of "Mother's love"? Please put down very briefly in the space below what came to your mind.

1.
2.
3.

APPENDIX B Questionnaire II: Agreement/disagreement to the statements concerning "Mother's love" and related ideas.

A number of statements concerning "Mother's love" and other related ideas are given below. Please read carefully each statement and circle the number on the seven-point scale which correspond to your judgment to each statement.

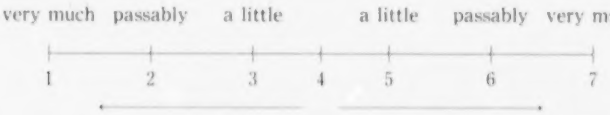


1. Mother's love is an instinct. ····· 1 2 3 4 5 6 7
2. A mother can give non-differential love to all her children. ····· 1 2 3 4 5 6 7
3. A child is incompetent at birth. ····· 1 2 3 4 5 6 7
4. Mother and child are one in body and soul. ····· 1 2 3 4 5 6 7
5. Women who havn't given birth to a baby can not have mother's love. ····· 1 2 3 4 5 6 7
6. Mother's love is "gratuitous" love without expecting any "return". ····· 1 2 3 4 5 6 7
7. Mothers would love more the "troublesome" or "difficult" child. ····· 1 2 3 4 5 6 7
8. Children should be stimulated as much as possible from an early age in order to develop their competence. ····· 1 2 3 4 5 6 7
9. You would like to be always with your children because of your love for them. ····· 1 2 3 4 5 6 7
10. Mother's love for a child changes its nature and form as the child gets older. ····· 1 2 3 4 5 6 7
11. Mother's love is to understand well a child and to share feelings with him. ····· 1 2 3 4 5 6 7
12. Mother's love can be given to a child of others. ····· 1 2 3 4 5 6 7
13. Even a very little baby can profit from early stimulation and intervention. ····· 1 2 3 4 5 6 7
14. A baby is an independent being different from mother after birth. ····· 1 2 3 4 5 6 7
15. Mother's love to a child changes as mother gets older. ····· 1 2 3 4 5 6 7
16. Mother's love is as deep as an ocean and as endlessly wide as the sky. ····· 1 2 3 4 5 6 7
17. Love for a child has something in common with love for a pet animal. ····· 1 2 3 4 5 6 7
18. Children are born with potentials to grow and develop on their own. ····· 1 2 3 4 5 6 7
19. In certain cases, a parent could kill her/his child because of her/his love for the child. ····· 1 2 3 4 5 6 7
20. The bigger the hardships in childrearing are, the stronger the mother's love is. ····· 1 2 3 4 5 6 7
21. Mother's love is "dedication". ····· 1 2 3 4 5 6 7
22. Among her own children, a mother gives differential love to them. ····· 1 2 3 4 5 6 7
23. It's not so meaningful to provide various stimulation and intervention to a child from a very early age. ····· 1 2 3 4 5 6 7
24. If you really love your child, you will never dare to kill or abandon him in any case. ····· 1 2 3 4 5 6 7
25. Excessive hardships in childrearing may weaken the love for a child. ····· 1 2 3 4 5 6 7
26. If you love your child, you should respect the child's freedom. ····· 1 2 3 4 5 6 7
27. When the love for a child is strong enough, any hardship can be born. ····· 1 2 3 4 5 6 7
28. If you really love your child, you should give the first priority to childrearing. ····· 1 2 3 4 5 6 7
29. Parental love for children can be communicated to them without being expressed verbally. ····· 1 2 3 4 5 6 7
30. If you deeply love your child, you should not scold him so severely. ····· 1 2 3 4 5 6 7
31. If you love your child, you can accept and permit almost everything he does. ····· 1 2 3 4 5 6 7
32. Nothing can be a greater pleasre than seeing a child's smiling face and growth. ····· 1 2 3 4 5 6 7
33. Even if you have a little child, you can do both childrearing and work. ····· 1 2 3 4 5 6 7
34. Even if you love your child, your love cannot be communicated to him unless you express it verbally. ····· 1 2 3 4 5 6 7

35. If you deeply love your child, you need to scold him severely when necessary. ····· 1 2 3 4 5 6 7
36. Stricter disciplining produces a better child. ····· 1 2 3 4 5 6 7
37. Childrearing gives Parents a pleasure, even if some difficultkes accompany it. ····· 1 2 3 4 5 6 7
38. Mothers who work outside in the daytime while having
a little child, tend to lack love for the child. ····· 1 2 3 4 5 6 7
39. The amount of "skinship" (physical contact) is
a "barometer" or a scale of love for a child. ····· 1 2 3 4 5 6 7
40. If you truly love your child, you can not beat or strike bitterly his face or head. ····· 1 2 3 4 5 6 7
41. Child's mischievous behaviors should be overlooked
and allowed as much as possible. ····· 1 2 3 4 5 6 7
42. Mothers who love their own children are also kind to other people. ····· 1 2 3 4 5 6 7
43. Working mothers love their children more deekly than
mothers who always stay home with their children. ····· 1 2 3 4 5 6 7
44. Parents should have not only love for their children but also the
techniques and methods to communicate and make it known to them. ····· 1 2 3 4 5 6 7
45. Parents who easily get upset with their children and scold
or beat them fiercely can not be regarded as loving their children. ····· 1 2 3 4 5 6 7
46. If you wish for your children's real growth,
you should have them experience some hardships. ····· 1 2 3 4 5 6 7
47. Given strong love for children, a mother can be strong enough as a human being. ··· 1 2 3 4 5 6 7
48. Mothers with small children who work outside the home
in the daytime should feel guilty for their children. ····· 1 2 3 4 5 6 7
49. It is when we are giving care to our children
that we feel ourselves really loving children. ····· 1 2 3 4 5 6 7
50. No matter how we love our children, we sometimes find them a nuisance. ····· 1 2 3 4 5 6 7

APPENDIX C Questionnaire III : Semantic differential type rating on "Mother's love"

Fifty five pairs of contrasted adjectives are given below. Please make your judgment how "Mother's love" is close to either of the two extremes on each pair of the adjectives.



1. high ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· low
2. strong ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· weak
3. motionless ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· full of motion
4. empirical ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· instinctive
5. abstract ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· concrete
6. vehement ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· tranquil
7. masculine ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· feminine
8. innate ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· shaped
9. obscure ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· clear
10. emotional ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· rational
11. longsighted ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· shortsighted
12. iron-like ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· cotton-like
13. spiritual ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· behavioral
14. natural ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· artificial
15. stylized ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unstylized
16. reasonable ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unreasonable
17. heavy ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· light
18. varied ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unvaried
19. effortful ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· effortless
20. simple ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· complex
21. cold ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· warm
22. soft ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· hard
23. conscious ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unconscious
24. changes by effort ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unchangeable by effort
25. verbalizable ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unverbalizable
26. practical ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· theoretical
27. open ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· closed
28. stable ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unstable
29. rewarding ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· non-rewarding
30. of both sexes ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· only of women
31. dark ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· bright
32. clear-cut ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· fuzzy
33. narrow ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· wide
34. firm ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· shaky
35. fruitful ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· fruitless
36. common ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· special
37. bad ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· good
38. logic-free ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· logic-bound
39. shallow ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· deep
40. placid ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· restless

41. turbid ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· clear
42. unconfined ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· confined
43. short-lived ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· long-lasting
44. much-gaining ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· less-gaining
45. unsubstitutive ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· substitutive
46. rejecting ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· embracing
47. inconsistent ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· consistent
48. joyful ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· joyless
49. uniform ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· diverse
50. clever ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· stupid
51. meaningless ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· meaningful
52. biased ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· unbiased
53. beautiful ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· ugly
54. pleasant ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· painful
55. noble ····· 1 — 2 — 3 — 4 — 5 — 6 — 7 ····· ignoble

執筆者紹介（掲載順）

フレデリック•モリソン（教授・ノース・カロライナ大学・アメリカ）
デーヴィッド・デイ（教授・ニューヨーク州立大学バッファロー校・アメリカ）
ゲール・リバティーニ（心理職専門研究員・マサチューセッツ大学・アメリカ）
宮本美沙子（教授・日本女子大学）
金谷有子（助教授・國学院女子短期大学）
ドナ・ブラッドショウ（心理専門研究員・ボストン日本協会・アメリカ）
ジョセフ・キャンポス（教授・カリフォルニア大学・アメリカ）
ローズマリー•キャンポス（助教授・カリフォルニア大学・アメリカ）
三宅和夫（教授・川村学院女子大学）
須田治（助教授・東京都立大学）
陳省仁（助教授・北海道大学）
臼井博（助教授・北海道教育大学）
佐藤公治（助教授・北海道大学）
城谷ゆかり（助手・附属乳幼児発達臨床センター）
若井邦夫（教授・附属乳幼児発達臨床センター）

乳幼児発達臨床センター年報

第14号（1990—1991）

平成4年3月2日印刷　3月5日発行

編集発行者　若井邦夫

印刷所　興国印刷株式会社

発行所　北海道大学教育学部

附属乳幼児発達臨床センター

〒060 札幌市北区北11条西7丁目

電話(011) 716-2111 内線3109

ANNUAL REPORT

RESEARCH AND CLINICAL CENTER FOR CHILD DEVELOPMENT

No. 14（1990-1992）

Date of Print: March 2, 1992

Date of Publication: March 5, 1992

Editor: Kunio Wakai

Printed: Kokoku Printing Co., Sapporo

Publisher: Research and Clinical Center for Child Development, Faculty of Education, Hokkaido University

Nishi-7, Kita-11, Kita-ku, Sapporo 060 Japan

Phone: 011-716-2111 (Ex. 3109)